1983

AIR QUALITY CONTROL FOR ARIZONA

1983

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FOR ARIZONA

Annual Report

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HONORABLE BRUCE BABBITT
Governor
State of Arizona

ARIZONA DEPARTMENT OF HEALTH SERVICES
Boyd Dover, Acting Director

Prepared by The Division of Environmental Health Services
Bureau of Air Quality Control

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1. Introduction

Introduction

The State Bureau of Air Quality Control, within the Division of Environmental Health Services of the Department of Health Services has primary responsibility for the control of air pollution associated with the original State jurisdiction sources and in counties where jurisdiction has been asserted. Original jurisdiction sources include:

1. Statutory major sources, which are defined as those capable individually of generating more than 75 tons of air contaminants per day, or that are involved in copper smelting or the refining of crude oil.

2. Mobile sources, which are those capable of being operated in more than one county.

3. Activities of agencies of the State and its political subdivisions.

The State has asserted jurisdiction for all air pollution control matters in Apache, Cochise, La Paz, Navajo, Santa Cruz, Yavapai, and Mohave Counties.

The purpose of the Bureau of Air Quality Control is to carry out the Legislature's intent "to exercise the police power of this State in a coordinated statewide program to control present and future sources of emission of air contaminants to the end that air polluting activities of every type shall be regulated in a manner that insures the health, safety, and general welfare of all of the citizens of the State; protects property values; and, protects plant and animal life". The Rules and Regulations for Air Pollution control provide for the attainment and maintenance of ambient air quality standards in accordance with the mandate of the Clean Air Act. To accomplish its purpose and fulfill United States Environmental Protection Agency (EPA) program objectives for the State of Arizona, the Bureau of Air Quality Control is divided into sections with the responsibilities indicated below.

1. Planning and Special Projects

One of the primary responsibilities of this Section is the development and management of the State Implementation Plan (SIP), the plan which the State follows to attain and maintain National Ambient Air Quality Standards (NAAQS). The SIP, which is required by federal law, is composed of State and County rules and regulations for air pollution control, plus certain plans and strategies.

A major portion of the State planning activity is directed towards nonattainment areas, areas in which violations of NAAQS occur. In Arizona, where there are ten nonattainment areas, a Nonattainment Plan (NAP) must be developed for each area. The State devises each NAP

in coordination with counties, councils of government, local officials, and the U. S. EPA.

In order to check the effectiveness of each NAP, the Section reviews air pollution data in each nonattainment area for trends. The results of each review are summarized in an annual report, referred to as a reasonable further progress (RFP) report, and submitted to EPA.

The Section also coordinates the preparation, review, and recording of rules and regulations. This activity involves holding public hearings to review regulations. Subsequently, the hearing panel formulates recommendations and the regulations are certified by the Attorney General and filed with the Secretary of State.

Administration and management of the federal grant is an important task of this section. Closely associated with this activity is the administration of fiscal matters such as budgets, contracts, and purchasing.

The Planning and Special Projects Section develops and maintains a statewide emissions inventory of all criteria pollutants; that is, pollutants for which there are ambient air quality standards.

Environmental impact statements for federally-funded construction projects such as sewage treatment plants, airports, and highways are reviewed to assure that applicable regulations will be met.

2. Engineering Services

Operation and administration of the State permit system is a vital function of Engineering Services. This includes the review of applications for installation permits for new or modified sources and operating permits for existing sources. In the case of installation permits, technical data submitted with the application must be evaluated to assure that the planned facility is capable of meeting all regulations. In regards to operating permits, this Section reviews emission tests and inspection reports to determine if the source is in compliance with rules and regulations.

As a part of the permitting activity, Engineering Services maintains the master file for all sources under State permit. Also, the Section keeps abreast of the state of the art in air pollution control equipment by inspection of newly-constructed facilities and by survey of literature.

Tax relief certification is another responsibility which involves certification of equipment as air pollution control devices for the purpose of special amortization.

3. Compliance

Determining the capability of sources to comply with rules and regulations is a major responsibility of the Compliance Section. This is done by conducting or evaluating mass emissions tests or observing visible emissions for each source. Compliance with applicable regulations must be demonstrated in these tests before a source can obtain an operating permit. Conditions deemed necessary to assure continuing compliance may be included in the operating permit.

In addition to checking emissions, the Compliance Section must evaluate each source's impact on air quality to verify compliance. This entails the review of air quality data obtained by State and industrial monitoring stations. Also, the Section must perform quality assurance checks on the monitors to validate the data.

If a source is found to be violating regulations, the Compliance Section initiates enforcement action by the issuance of a notice of violation (NOV) to the source operator. An effort is made to obtain voluntary action by the operator to correct the noncomplying conditions.

Beyond this a number of forms of enforcement action appropriate to the case may be taken such as:

1. Referral of the NOV to the responsible officer of the source with a written request for corrective action and response.

2. Administrative conferences designed to obtain voluntary corrective action commitments from the source.

3. Permit Denial.

4. Modification of Permit conditions to require additional pollution controls or improved work practices.

5. Orders of Abatement imposing conditions designed to resolve or mitigate the noncompliance condition(s). These orders are subject to appeal to the Air Pollution Control Hearing Board which may dismiss, uphold or modify the terms of the order.

6. Injunctive relief from the Superior Court of the county concerned may be sought against any source in violation of the terms of an Order of Abatement.

Misdeameanor criminal charges may be filed against a noncomplying source which would subject the sources to fines of up to $1,000 per day for each day that violation(s) are proven.

The investigation of citizen complaints in those areas where the State has jurisdiction is another function of Compliance. These investigations sometimes require development and operation of special monitoring techniques.

The Compliance Section trains and certifies visible emissions observers from control agencies and industry in accordance with the approved method for determining the opacity of industrial plumes.

4. Technical Services

The operation of the State air quality monitoring network is the basic task of the Technical Services Section. Included in this task are the procurement, installation, calibration and servicing of monitoring instruments, plus auxiliary equipment and housing. The monitoring instruments include anemometers, wind vanes, temperature differential sensors, continuous gas analyzers, high volume particulate samplers, and data recording devices.

Data quality assurance is an important part of the monitoring network operation. In meeting this need, technicians of the Section perform quarterly multi-point calibrations on each of the 20 analyzers in the network, and semiannual calibrations of the approximately 35 high volume samplers. Biweekly precision, span and operational checks are also performed on the analyzers. At this time, the recorded data charts and magnetic tapes are brought in for analysis and report preparation.

In support of field calibration and quality assurance activities, Technical Services maintains a laboratory which provides standards for flow, temperature, mass, pressure, voltage, and pollutant concentrations. These standards are traceable to the National Bureau of Standards or other recognized agencies.

Technical Services is also responsible for the support engineering associated with the Bureau's automated data acquisition systems, including systems design, equipment procurement, and programming.

5. Monitoring

The processing and reporting of ambient air quality data from the State monitoring network is the chief function of the Monitoring Section. Based on these data, the Bureau determines the compliance status of each source with respect to air quality standards. Control strategies for each source are then developed and evaluated.

The Monitoring Section conducts mathematical modeling studies of air pollutant dispersion, from both point and area sources. This activity is a vital part of the review of permit applications submitted by proposed industrial plants. If modeled projections indicate that the source will not meet applicable standards, the plant design or operating procedures must be modified to demonstrate compliance.

Another function of modeling is the projection of vehicular-related air quality trends in urban areas to evaluate the effectiveness of current and proposed control strategies. Modeling is also performed to delineate the spatial variation in pollutant concentrations in point and urban source areas to determine monitoring site locations and assess population exposure.

The Monitoring Section reviews the literature and performs limited studies concerning the effects of air pollution on public health, property, and visibility. This is necessary to ensure that State regulations and Bureau enforcement actions are adequate for protection of public health and welfare.

The management and coordination of emergency episode prevention activities is the responsibility of this Section. This entails close observation of

meteorological and air quality conditions, forecasting air quality, issuing air pollution alerts, and determining appropriate curtailment actions.

Other Activities

In addition to the above Sections, the Bureau has technical staff members permanently assigned to the Northern and Southern Regional offices located in Flagstaff and Tucson, respectively, to aid in enforcement and more adequately provide Bureau services on a state-wide basis. Also, funding is provided by the Bureau for legal services and laboratory personnel.

6. Bureau of Vehicular Emissions Inspection

The Bureau of Vehicular Emissions Inspection conducts an annual emissions inspection on all gasoline-fueled vehicles under 14 years of age registered in the urban (carbon monoxide and ozone) nonattainment areas of Pima and Maricopa Counties. About 1.2 million inspections are conducted each year at nine contractor-operated inspection stations. In addition, approximately 120,000 vehicles are inspected each year in self-inspecting fleets. Bureau personnel assure the quality of emission measurements at both contractor-operated and fleet inspection facilities. In addition, they instruct and train automotive repair mechanics in proper tune-up procedures.

During the inspection, exhaust concentrations of carbon monoxide and hydrocarbons are measured and compared to standards established by the Department of Health Services. These standards vary in stringency with emission control technologies mandated by the federal government.

Vehicles identified as high and gross polluters are required to be repaired and reinspected. In 1983, repairs to those vehicles identified as not meeting the standards improved the average idle emissions of all vehicles in the program by 41% in carbon monoxide and 45% in hydrocarbons.

2. Summary of 1983 Activities

Summary of 1983 Activities

One public hearing on rules and regulation development was held in 1983 regarding revisions to the new source review (NSR) and nonferrous smelter orders (NSO) package. After review of public comments by the hearing panel, final regulations were prepared, filed with the Secretary of State, and submitted to EPA as a State Implementation Plan (SIP) revision.

Nonattainment area planning focused mainly on carbon monoxide. A redesignation (shrinking) of the Metropolitan Pima County Carbon Monoxide Nonattainment Area Plan was submitted to EPA on March 4, 1983. EPA published the request as proposed rulemaking in the November 7, 1983, Federal Register. The responses received during the comment period are now being analyzed by EPA.

Regulation of industrial facilities under state jurisdiction in 1983 resulted in the following activities:

Operating Source Inspections	662
Visible Emissions Tests	284
Mass Emissions Tests	196
Emissions Monitor Tests	10
Source Ambient Monitor Audits	25
Bureau Ambient Monitor Audits	8
Complaint Investigations	93
Notices of Violation Served	14
Orders of Abatement Served	3
Operating Permits Issued	147
Installation Permits Issued	18
New Source Installation Inspections	42

In addition, one consent decree was negotiated to prevent a health hazard from sulfur dioxide generators owned by International Environmental, Inc.

The State's monitoring network consisted of the following number of sites:

Pollutant	Number of Sites
Carbon Monoxide	4
Lead	10
Ozone	4
Particulates	24
Sulfur Dioxide	11

Data summaries for these sites, plus all county and industrial sites operated in 1983, are included in Appendix A. Long-term trends in air quality are also included in Appendix A.

In addition to operating the network, the State conducted the following special monitoring studies:

1983 State Fair Air Quality Study

Neighborhood Scale Carbon Monoxide Site Development in West Phoenix

Phoenix Haze Composition Study

During the past years attempts have been made to establish procedures for data retrieval from EPA's National Computer Center (NCC) using the Hewlett Packard 9825 calculator. Results to date indicate about 50% of data submitted to NCC survives the review process for inclusion in the permanent data base. This requires retransmittal of the data to supply the missing portions.

A study conducted in 1983 indicated that several areas in the Bureau would benefit from using desk-top microcomputers to assist in handling the ever-increasing data flow from pollutant monitoring, permitting, source inventories, hearings, etc. This proposal is being considered for submission to EPA as a supplemental grant objective.

The following technical reports were prepared by Bureau staff in 1983, and copies can be obtained by contacting the author:

"Ambient Air Asbestos Monitoring at the Mountain View Mobile Home Estates in Globe, Arizona", David O. Chelgren and Jon A. Dahl", June, 1983

"An Exploration of the Health Effects of Carbon Monoxide in the Phoenix Area", O. M. Watterson, Ph.D., March 1983

"Carbon Monoxide and Cardiac Deaths in the Roosevelt Risk Area", O. M. Watterson, Ph.D., April 1983

"Preliminary Report on the Ability of Vegetative Barriers to Reduce Ambient Particulate Concentrations", Gary R. Neuroth, February, 1983

"Diurnal Carbon Monoxide Cycle in Phoenix", Gary R. Neuroth, July, 1983

"1983 Arizona State Fair Air Quality Study", Robert D. Alley, February, 1984

APPENDIX A: 1983 Air Quality Data

Air Quality Data

Table 1 lists the counties and towns monitored in the state, including the pollutants monitored. For reference purposes a map of Arizona is shown in Figure 1.

1983 data summaries which are tabulated in Tables 2 through 9 consist of annual mean and maximum and second highest short-term average concentrations, numbers of exceedances of short-term air quality standards, and numbers of samples collected or hours monitored. The following abbreviations and footnotes were used in these data summaries:

GENERAL

NA	Not Applicable
NR	Not Reported

OPERATORS

AEPCO	Arizona Electric Power Cooperative, Inc.
APS	Arizona Public Service Company
ICCC	Inspiration Consolidated Copper Company
JCC	Joint Control Center - A jointly owned system operated by ASARCO,Incorporated and Kennecott Minerals Company
Magma	Magma Copper Company
Maricopa	Maricopa County Department of Health Services, Bureau of Air Pollution Control
NPS	National Park Service
Noranda	Noranda Lakeshore Mines, Incorporated
PD	Phelps Dodge Corporation
Pima	Pima County Health Department, Air Quality Control District
P-G	Pinal-Gila Counties Air Quality Control District
SRP	Salt River Project
SCE	Southern California Edison Company
State	Arizona Department of Health Services, Bureau of Air Quality Control
TEP	Tucson Electric Power Company

EQUIPMENT

Carbon Monoxide NDIR	Non-dispersive infrared

EQUIPMENT (Cont'd)

Nitrogen Dioxode	
Chem	Chemiluminescent
Ozone	
Chem	Chemiluminescent
UV	Ultraviolet absorption
Particulates	
Hi-Vol	High volume air sampler
Sulfur Dioxide	
Coul	Coulometric
Flame	Flame photometric
Fluor	Fluorescent

Footnotes:

a. New site.

b. Site terminated or method discontinued.

c. Mean value based on a limited number of samples.

d. Site operated on a seasonal schedule.

A review of trends follows the 1983 data summaries, presenting monitoring data for the past five to ten years.

Table 1

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
APACHE:						
St. Johns			X	X	X	X
Springerville			X		X	X
COCHISE:						
Bisbee					X	
Douglas		X			X	X
Dragoon			X		X	X
Hereford		X			X	X
Kansas Settlement				X	X	X
McNeal						X
Paul Spur					X	
Sierra Vista	X			X	X	
COCONINO:						
Flagstaff	X			X	X	
Grand Canyon				X	X	
Lechee					X	
Page			X	X	X	X
Wahweap			X	X	X	X
GILA:						
Hayden		X			X	X
Miami		X			X	X
Payson					X	
Roosevelt					X	
Winkelman						X

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
GRAHAM:						
Safford					X	
GREENLEE:						
Morenci		X			X	X
MARICOPA:						
Glendale	X	X		X	X	
Mesa	X	X		X	X	
Phoenix	X	X	X	X	X	X
Scottsdale	X	X	X	X	X	
MOHAVE:						
Bullhead City					X	X
Davis Dam					X	X
Riviera					X	X
NAVAJO:						
Joseph City			X		X	X
Show Low					X	
PIMA:						
Ajo		X			X	X
Corona de Tucson					X	

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
PIMA (cont'd):						
Green Valley		X			X	X
Organ Pipe (N.M.)		X			X	
Redington						X
Rillito					X	
Tucson	X	X	X	X	X	X
PINAL:						
Apache Junction					X	
Casa Grande					X	
Kearney						X
Mammoth					X	X
Marana					X	
Oracle						X
San Manuel		X			X	X
Stanfield					X	
SANTA CRUZ:						
Nogales		X			X	
YAVAPAI:						
Clarkdale					X	
Montezuma Castle (N.M.)		X			X	

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
YAVAPAI (cont'd):						
Nelson					X	
Prescott	X			X	X	
YUMA:						
Yuma	X			X	X	

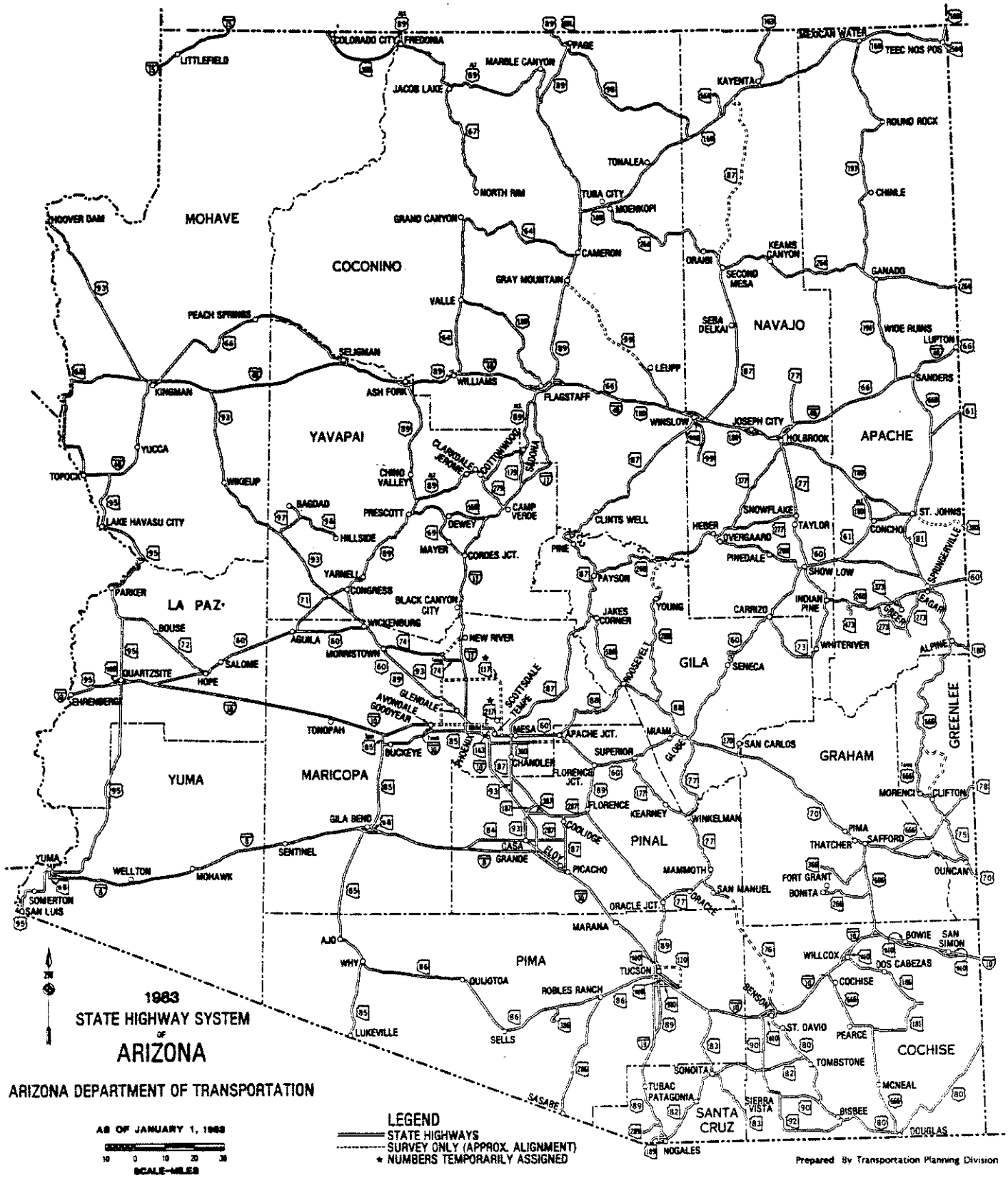
1983
STATE HIGHWAY SYSTEM
OF
ARIZONA
ARIZONA DEPARTMENT OF TRANSPORTATION
AS OF JANUARY 1, 1983
SCALE-MILES
LEGEND
STATE HIGHWAYS
SURVEY ONLY (APPROX. ALIGNMENT)
★ NUMBERS TEMPORARILY ASSIGNED
Prepared By Transportation Planning Division
MOHAVE
COCONINO
YAVAPAI
NAVAJO
APACHE
LA PAZ
YUMA
MARICOPA
GILA
PINAL
GRAHAM
GREENLEE
PIMA
COCHISE
SANTA CRUZ
GREENLEE
COLORADO CITY
FREDONIA
PAGE
LITTLEFIELD
MARBLE CANYON
JACOB LAKE
KAYENTA
TEEC NOS POS
ROUND ROCK
CHINLE
TONALEA
NORTH RIM
TUBA CITY
MOENKOPI
HOOVER DAM
GRAND CANYON
CAMERON
KEAMS CANYON
SECOND MESA
GANADO
GRAY MOUNTAIN
VALLE
SEBA DELKAI
WIDE RUINS
LUPTON
PEACH SPRINGS
SELIGMAN
LEUPP
SANDERS
KINGMAN
ASH FORK
WILLIAMS
FLAGSTAFF
WINSLOW
JOSEPH CITY
HOLBROOK
YUCCA
CLARKDALE
JEROME
COTTONWOOD
SEDONA
CHINO VALLEY
TOPOCK
WIKIEUP
BAGDAD
PRESCOTT
CAMP VERDE
DEWEY
CLINTS WELL
SNOWFLAKE
TAYLOR
ST. JOHNS
CONCHO
LAKE HAVASU CITY
HILLSIDE
MAYER
CORDES JCT.
HEBER
OVERGAARD
PINE
PINEDALE
SHOW LOW
SPRINGERVILLE
EAGAR
YARNELL
PAYSON
PARKER
CONGRESS
BLACK CANYON CITY
JAKES CORNER
YOUNG
CARRIZO
INDIAN PINE
GARDNER
BOUSE
WICKENBURG
NEW RIVER
AGUILA
MORRISTOWN
WHITERIVER
ALPINE
QUARTZSITE
HOPE
SALOME
SENECA
ROOSEVELT
GLOBE
CHRISTMAS
GLENDALE
AVONDALE
GOODYEAR
SCOTTSDALE
TEMPE
TONOPAH
MESA
APACHE JCT.
MIAMI
SAN CARLOS
BUCKEYE
SUPERIOR
PHOENIX
CHANDLER
FLORENCE JCT.
MORENCI
CLIFTON
FLORENCE
KEARNEY
WINKELMAN
GILA BEND
COOLIDGE
CASA GRANDE
ELOY
PICACHO
MAMMOTH
PIMA
SAFFORD
THATCHER
YUMA
SENTINEL
WELLTON
MOHAWK
SOMERTON
SAN LUIS
FORT GRANT
BONITA
DUNCAN
SAN MANUEL
ORACLE JCT.
ORACLE
MARANA
AJO
WHY
OUIJOTOA
TUCSON
BOWIE
SAN SIMON
WILLCOX
DOS CABEZAS
COCHISE
ROBLES RANCH
BENSON
LUKEVILLE
SELLS
ST. DAVID
PEARCE
TOMBSTONE
SONOITA
MCNEAL
TUBAC
PATAGONIA
SIERRA VISTA
BISBEE
DOUGLAS
SASABE
NOGALES

Table 2

1983 Carbon Monoxide Data (in mg/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR. AVERAGE MAX.	1-HR. AVERAGE 2ND HIGH	8-HR. AVERAGE MAX	8-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 8-HR. STANDARD DAYS	NO. OF EXCEEDANCES OF 8-HR. STANDARD TIMES	NO. OF SAMPLES
COCHISE:										
Sierra Vista[d]	Fry Blvd.	State	NDIR	21	18	7	6	0	0	4312
COCONINO:										
Flagstaff[d]	2501 N.4th St.	State	NDIR	13	12	8	7	0	0	3781
MARICOPA:										
Glendale	6000 W.Olive	Maricopa	NDIR	10	9	5	4	0	0	6362
Mesa	Broadway&Brooks	Maricopa	NDIR	11	10	8	8	0	0	8368
Phoenix	4732 S.Central	Maricopa	NDIR	15	14	8	7	0	0	8213
Phoenix	8531 N.6th St.	Maricopa	NDIR	18	16	9	8	0	0	724
Phoenix	1845 E.Roosevelt	Maricopa	NDIR	19	18	15	14	15	17	8569
Phoenix	3315 W.Ind.Sch.	Maricopa	NDIR	42	39	24	23	48	78	6900
Phoenix[a,b]	4202 W.Bellview	Maricopa	NDIR	22	19	16	16	8	11	6499
Scottsdale	2857 N.Miller	Maricopa	NDIR	18	17	12	11	3	3	7087
Scottsdale	13665 N.Sctsdl.	Maricopa	Site Temporarily Inactivated,							
PIMA:										
Tucson	151 W.Congress	Pima	NDIR	21	20	11	9	1	1	8069
Tucson	22nd & Craycroft	Pima	NDIR	19	12	7	6	0	0	8275

Table 2 (Cont'd)

1983 Carbon Monoxide Data (in mg/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR. AVERAGE MAX.	1-HR. AVERAGE 2ND HIGH	8-HR. AVERAGE MAX.	8-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 8-HR. STANDARD DAYS	NO. OF EXCEEDANCES OF 8-HR. STANDARD TIMES	NO. OF SAMPLES
PIMA (cont'd):										
Tucson	22nd & Alvernon	Pima	NDIR	25	22	13	12	10	10	8570
YAVAPAI:										
Prescott[d]	Co.Maint. Yard	State	NDIR	16	15	9	7	0	0	4312
YUMA:										
Yuma[d]	1485 Second Ave.	State	NDIR	12	10	5	5	0	0	4286

STATE AND FEDERAL STANDARD (mg/m^3): (Primary and Secondary) 1-Hour Average 40; 8-Hour Average 10

Table 3

1983 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
COCHISE:										
Douglas	1.2 mi. N. of Smelter	State	.04	.20	.12	.08	14	14	13	15
Douglas	0.8 mi. N. of Smelter	PD	NR	NR	NR	NR	NR	NR	NR	NR
Douglas	F Avenue & 9th Street	PD	NR	NR	NR	NR	NR	NR	NR	NR
Douglas	Pirtleville	PD	NR	NR	NR	NR	NR	NR	NR	NR
Douglas	City Park	State	.14[C]	.33[C]	.13[C]	.29[C]	6	6	3	5
Hereford	PD Exper. Farm	PD	NR	NR	NR	NR	NR	NR	NR	NR
GILA:										
Hayden	164 4th Ave.	JCC	.31	.25	.21[C]	.14[C]	13	15	9	8
Hayden	Jail	State	.29	.37	.35	.16	13	14	13	13
Miami	Fire Station	State	.22	.17	.11	.16	15	14	15	11
GREENLEE:										
Morenci	Cadillac Point	PD	NR	NR	NR	NR	NR	NR	NR	NR
Morenci	Fina Station	PD	NR	NR	NR	NR	NR	NR	NR	NR

Table 3 (Cont'd)

1983 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
GREENLEE (cont'd):										
Morenci	Fairbanks	PD	NR	NR	NR	NR	NR	NR	NR	NR
Morenci	Standpipe	PD	NR	NR	NR	NR	NR	NR	NR	NR
Morenci	Stargo	PD	NR	NR	NR	NR	NR	NR	NR	NR
Morenci	Stargo	State	.05	.05	.03[c]	.05[c]	12	15	8	10
MARICOPA:										
Glendale	6000 W. Olive	Maricopa	.40	.20	.20	.40	12	13	15	12
Mesa	Broadway & Brooks	Maricopa	.40	.40	.20	.30	15	14	14	15
Phoenix	1845 E. Roosevelt	Maricopa	.70	.40[c]	.30	.50	15	10	15	14
Phoenix	8531 N. 6th Street	Maricopa	.60	.40	.30[c]	.40	15	15	11	14
Phoenix	4732 S. Central	Maricopa	.50	.20	.20[c]	.40	15	14	11	15
Phoenix	1826 W. McDowell	Maricopa	1.10	.60	.40	.70[c]	13	15	13	7
Phoenix[a,b]	4202 W. Belleview	Maricopa	-	.30[c]	.30	.80[c]	-	7	15	5

Table 3 (Cont'd)

1983 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
MARICOPA (cont'd):										
Scottsdale	13665 N.Scottsdale Rd.	Maricopa	Site Temporarily Inactivated.							
Scottsdale	2857 N. Miller Rd.	Maricopa	.50	.30	.30	.50	13	15	13	12
PIMA:										
Ajo	Well Road	State	.06	.07	.04	.06	15	15	14	14
Ajo	Camelback Mountain	PD	Site Temporarily Inactivated.							
Ajo	Oxidation Pond	PD	Site Temporarily Inactivated.							
Ajo	South of Tailings Dam	PD	Site Temporarily Inactivated.							
Ajo	Town Square	PD	Site Temporarily Inactivated.							
Organ Pipe (N.M.)	Visitors Center	State	.03	.05	.00	.01	13	15	12	11
Tucson	7920 E. Tanque Verde	Pima	.27	.12	.09	.17	11	15	13	15
Tucson	32 North Stone	PD	Site Temporarily Inactivated.							
Tucson	1016 W. Prince Road	Pima	.60	.31	.32	.65	14	15	14	15
Tucson	Broadway & Swan	Pima	.51	.27	.23	.47	14	15	15	14

Table 3 (Cont'd)

1983 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
PINAL:										
San Manuel	LDS Church	State	.06	.08	.07	.07	15	14	15	15
SANTA CRUZ:										
Nogales	U. S. Post Office	State	.39	.34[C]	.28[C]	.55	12	10	8	13
YAVAPAI:										
Montezuma Castle (N.M.)	Maint. Building	State	.03	.04	.06	.05[C]	15	13	13	9

STATE AND FEDERAL STANDARD (ug/m^3): Calendar Quarter Average
(Primary and Secondary) 1.5

Table 4

1983 Nitrogen Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	AVERAGE	MAXIMUM 1-HOUR	MAXIMUM 24-HOUR	NO. OF 1-HOUR SAMPLES
APACHE:							
St. Johns	Mesa Parada	SRP	Chem.	4	86	NA	7344
Springerville	Airport	TEP	Chem.	3	45	9	8359
Springerville	4 mi.N.E.of Town	TEP	Chem.	3	47	13	8533
COCONINO:							
Page	Water Tower	SRP	Chem.	8	110	42	8468
Wahweap	Water Tank	SRP	Chem.	5[c]	67	26	3837
MARICOPA:							
Phoenix	1345 E. Roosevelt	Maricopa	Chem.	32	489	217	6877
Scottsdale	2857 N. Miller Rd.	Maricopa	Chem.	NR	NR	NR	1981
MOHAVE:							
Bullhead City	224 N. Main St.	SCE	Chem.	30	115	54	7837
PIMA:							
Tucson	22nd & Craycroft	Pima	Chem.	36	226	207	7845
Tucson	151 W. Congress	Pima	Chem.	60[d]	451	432	2895
STATE AND FEDERAL STANDARD (ug/m^3): (Primary and Secondary)				Annual Average 100			

Table 5

1983 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HOUR AVERAGE MAX.	1-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF STD.	COMPLIANCE STATUS EXCEEDANCES	NO. OF SAMPLES
APACHE:								
St. Johns	Mesa Parada	SRP	U.V.	.11	.11	0	0	7704
COCHISE:								
Kansas Settlement	1 mi.W.of Cotton Gin	AEPCO	U.V.	.08	.07	0	0	6250
Sierra Vista[d]	Fry Boulevard	State	U.V.	.07	.07	0	0	3165
COCONINO:								
Flagstaff[d]	2501 N. 4th St.	State	U.V.	.08	.08	0	0	4364
Grand Canyon	Clinic Bldg.	NPS	U.V.	.07	.06	0	0	4705
Page	Water Tower	SRP	U.V.	.07	.07	0	0	8338
Wahweap	Water Tank	SRP	U.V.	.06	.06	0	0	4295
MARICOPA:								
Glendale	6000 W. Olive	Maricopa	U.V.	.14	.12	1	.7	6782
Mesa	Broadway & Brooks	Maricopa	U.V.	.13	.12	1	.3	5005
Phoenix	3315 W.Ind.Sch.	Maricopa	U.V.	.15	.14	3	1.0	4723
Phoenix	1845 E. Roosevelt	Maricopa	U.V.	.16	.16	5	4.0	8141
Phoenix	8531 N. 6th St.	Maricopa	U.V.	.12	.11	0	1.7	6136
Phoenix[a,b]	4202 W. Belleview	Maricopa	U.V.	.12	.11	0	0	3399

Table 5 (Cont'd)

1983 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HOUR AVERAGE MAX.	1-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF STD.	COMPLIANCE STATUS EXCEEDANCES	NO. OF SAMPLES
MARICOPA (cont'd):								
Phoenix	4732 S. Central	Maricopa	U.V.	.15	.14	2	1.0	7382
Scottsdale	2857 N. Miller Rd.	Maricopa	U.V.	.15	.13	2	.7	7927
Scottsdale	13665 N.Sctsd. Rd.	Maricopa	U.V.	.03	.03	0	.3	737
PIMA:								
Saguaro Nat. Monument E.	Visitors Center	Pima	U.V.	.11	.11	0	0	8054
Tucson	151 W. Congress	Pima	U.V.	.11	.10	0	0	8590
Tucson	22nd & Craycroft	Pima	U.V.	.11	.10	0	0	7320
Tucson	9101 N. Thornydale	Pima	U.V.	.09	.09	0	0	4491
Tucson	4591 N. Pomona	Pima	U.V.	.12	.11	0	.3	7013
YAVAPAI:								
Prescott[d]	County Maint.Yard	State	U.V.	.08	.08	0	0	3645
YUMA:								
Yuma[d]	1485 2nd Avenue	State	U.V.	.11	.11	0	0	4011

STATE AND FEDERAL STANDARD: (Primary and Secondary) The standard is .12 ppm (235 ug/m^3) for the maximum daily 1-hour concentration. Compliance status is determined by computing the average number of days that the 1-hour standard has been exceeded per year for the past three years. No more than 1.0 exceedances per year over the last three years is permitted.

Table 6

1983 Particulates Data

High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
APACHE:								
St. Johns	Airport	SRP	22	93	43	0	0	59
St. Johns	Mesa Parada	SRP	11	32	28	0	0	58
St. Johns	Patterson Wellfield	SRP	13	41	31	0	0	58
Springerville	#1, Airport	TEP	12	112	106	0	0	311
Springerville	4 mi.N.E.	TEP	7	56	48	0	0	347
COCHISE:								
Bisbee	Warren City Hall	State	27	119	87	0	0	54
Douglas	1.2 mi.N. of Smelter	State	46	177	176	0	0	56
Douglas	0.75 mi.N. of Smelter	PD	39	173	110	0	1	58
Douglas	F Avenue & 9th St.	PD	68	196	184	0	7	59
Douglas	Pirtleville	PD	44	210	150	0	1	60
Douglas	City Park	State	91[c]	250	216	0	9	44

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
COCHISE (cont'd):								
Dragoon	N. Dragoon Mts.	AEPCO	25	162	118	0	1	265
Hereford[b]	P.D. Exper. Farm	PD	15[c]	20	19	0	0	5
Kansas Settlement	1 mi.W.of cotton gin	AEPCO	32	354	247	1	4	271
Paul Spur	Housing Area	State	284[c]	1222	740	24	34	41
Sierra Vista	Bartow Drive	State	48	125	115	0	0	53
COCONINO:								
Flagstaff	218 N. Leroux Street	State	68	193	187	0	7	46
Grand Canyon	Hopi Point	State	5	58	38	0	0	55
Lechee	Coppermine Road	SRP	22	92	57	0	0	54
Page	Airport	SRP	41	141	140	0	0	59
Page	Airport	State	31	98	92	0	0	59
Wahweap	Water Tank	SRP	23[c]	62	61	0	0	44

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
GILA:								
Hayden	164 4th Ave.	JCC	59	512	349	3	3	45
Hayden	Jail	State	98	337	294	2	17	53
Miami	Fire Station	State	70	172	163	0	2	55
Payson	County Courthouse	P-G	88	435	368	3	11	42
Roosevelt	Ranger Station	P-G	21	66	65	0	0	58
GRAHAM:								
Safford	523 - 10th Ave.	State	95	279	243	1	11	56
GREENLEE:								
Morenci	Cadillac Point	PD	33	219	82	0	1	57
Morenci	Fina Station	PD	38	123	101	0	0	56
Morenci	Fairbanks	PD	63	266	243	1	7	59
Morenci	Stargo	PD	44	149	136	0	0	59
Morenci	Standpipe	PD	17	141	80	0	0	56
Morenci	Stargo	State	43	159	110	0	1	45

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS FEDERAL SECONDARY	NO. OF SAMPLES
MARICOPA:								
Glendale	6000 W. Olive Avenue	Maricopa	83	153	150	0	1	52
Mesa	Broadway & Brooks	Maricopa	73	193	174	0	3	58
Phoenix	1845 E. Roosevelt	Maricopa	93	243	219	0	7	54
Phoenix	1826 W. McDowell	Maricopa	125	309	284	2	18	48
Phoenix	8531 N. 6th Street	Maricopa	107	228	195	0	14	55
Phoenix	4732 S. Central	Maricopa	105	256	191	0	9	55
Phoenix[a,b]	4202 W. Belleview	Maricopa	160[c]	342	308	5	15	27
Scottsdale	2857 N. Miller Road	Maricopa	82	166	142	0	1	53
Scottsdale	13665 N. Scottsdale Road	Maricopa	Site Temporarily Inactivated.					
MOHAVE:								
Bullhead City	224 N. Main Street	SCE	84	209	167	0	4	57
Davis Dam	Katherine Landing	SCE	25	71	55	0	0	60
Riviera	Ft. Mohave	SCE	35	93	93	0	0	57

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARD STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARD STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
NAVAJO:								
Joseph City	3.25 Mi.S,E. of Town	State	27	153	134	0	1	47
Joseph City	6 North Randall	APS	27	131	114	0	0	241
Joseph City	Met Tower	APS	14	112	94	0	0	247
Show Low	Deuce of Clubs Avenue	State	49	432	351	3	5	54
PIMA:								
Ajo	Well Road	State	56	1743	281	2	5	58
Ajo	Camelback Mountain	PD	23	600	91	1	1	50
Ajo	Oxidation Pond	PD	51	768	407	2	3	48
Ajo	South Tailings Dam	PD	46	244	203	0	3	48
Ajo	Town Square	PD	60	1067	137	1	1	49
Corona de Tucson	22000 S.Houghton Road	Pima	18	70	44	0	0	55
Green Valley	245 W. Esperanza	Pima	27	56	56	0	0	56
Organ Pipe (N.M.)	Visitors Center	State	16	44	32	0	0	51

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HR. AVERAGE MAX.	24-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR.STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR.STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
PIMA (cont'd):								
Rillito	Miller's Market	State	105[c]	268	184	1	7	34
Tucson	3915 E.Ft. Lowell Rd.	Pima	70	142	141	0	0	57
Tucson	7920 E.Tanque Verde Rd.	Pima	45	86	83	0	0	54
Tucson	2181 S. Harrison Rd.	Pima	48	105	85	0	0	50
Tucson	8100 S. Nogales Hwy.	Pima	34	63	62	0	0	58
Tucson[b]	32 N. Stone	PD	39[c]	92	69	0	0	29
Tucson	3401 W.Orange Grove Rd.	Pima	78	182	151	0	2	55
Tucson	1016 W. Prince Rd.	Pima	77	237	160	0	2	59
Tucson	1810 S. 6th Avenue	Pima	79	173	136	0	1	57
Tucson	2nd St. & Palm Ave.	Pima	54	122	105	0	0	58
Tucson	Broadway & Swan	Pima	59	144	117	0	0	58
Tucson	Irvington & Alvernon	TEP	135	330	237	1	18	50
Tucson	½ mi.E.of Irvington & Alvernon	TEP	76	428	301	4	6	50
Tucson	1970 W. Ajo Way	Pima	48	87	84	0	0	55

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS FEDERAL SECONDARY	NO. OF SAMPLES
PIMA (cont'd):								
Tucson	151 W. Congress	Pima	52	109	101	0	0	58
PINAL:								
Apache Junction	County Yard	P-G	51	194	111	0	1	58
Casa Grande	Indian Hwy. 6	Noranda	25	93	89	0	0	50
Mammoth	County Courthouse	P-G	37	74	73	0	0	59
Marana	Pinal Air Park	P-G	28	91	85	0	0	61
San Manuel	Dormsite	Magma	26	93	86	0	0	51
San Manuel	Peppersauce Wash	Magma	24	58	55	0	0	52
San Manuel	Golf Course	Magma	24[c]	99	59	0	0	40
San Manuel	LDS Church	State	33	104	90	0	0	59
San Manuel	Townsite	Magma	36	100	97	0	0	46
Stanfield	County Courthouse	P-G	92	675	287	2	9	59

Table 6 (Cont'd)

1983 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS FEDERAL SECONDARY	NO. OF SAMPLES
SANTA CRUZ:								
Nogales	U. S. Post Office	State	98[c]	840	284	3	14	43
YAVAPAI:								
Clarkdale	Fire Station	State	52	97	86	0	0	58
Montezuma Castle (N.M.)	Maint. Building	State	25	176	60	0	1	50
Nelson	1 mi.N.of Lime Plant	State	42	178	143	0	1	53
Prescott	Co. Maint. Yard	State	62	241	226	0	5	50
YUMA:								
Yuma	201 S. 2nd Avenue	State	107	347	276	3	14	53

STATE AND FEDERAL STANDARDS (ug/m^3):	Annual Geometric Mean	24-Hr. Average
Primary	75	260
Secondary	60	150

Table 7

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HOUR SAMPLES
APACHE:										
St. Johns	Mesa Parada	SRP	Fluor.	1	6	3	0	0	0	7992
Springerville	4 mi.N.E.of Town	TEP	Flame	8	21	18	0	0	0	8570
Springerville	Airport	TEP	Flame	8	47	16	0	0	0	8448
COCHISE:										
Douglas	0.75 mi.N.of Smelter	PD	Coul	48[c]	1093	254	0	0	0	6384
Douglas	Curtis	PD	Coul	35[c]	1153	275	0	0	0	6372
Douglas	Fir	PD	Coul	24[c]	812	157	0	0	0	6382
Douglas	F Ave.& 9th St.	PD	Coul	26[c]	1127	231	0	0	0	6288
Douglas	Queen	PD	Coul	32[c]	1100	223	0	0	0	6354
Douglas	Mobile IV	PD	Coul	26[c]	1231	262	0	0	0	6392
Douglas	County Hospital	PD	Coul	59[c]	1381	278	2	2	0	6385
Douglas	Pirtleville	PD	Coul	36[c]	1074	241	0	0	0	6365

Table 7 (Cont'd)

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. 3-HR.	AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HOUR SAMPLES
COCHISE (cont'd):										
Douglas	1.2 mi.N.of Smelter	State	Fluor.	36	1311	288	1	1	0	8355
Dragoon	N.Dragoon Mts.	AEPCO	Flame	3[c]	131	21	0	0	0	4749
Hereford[b]	PD Exper.Farm	PD	Coul	<1[c]	21	3	0	0	0	737
Kansas Settlement	1 mi.W.of Cotton Gin	AEPCO	Flame	14[c]	183	105	0	0	0	3156
McNeal[d]	Pinedo Farm	PD	Coul	6[c]	254	60	0	0	0	5159
McNeal	2.6 mi.WSW of Town	State	Fluor.	9[c]	800	524	0	0	0	6166
COCONINO:										
Page	Water Tower	SRP	Fluor.	6	324	92	0	0	0	7509
Wahweap[a]	Water Tank	SRP	Fluor.	9[c]	199	48	0	0	0	4226
GILA:										
Hayden	Town Hall	JCC	Coul	22	1062	172	0	0	0	8664
Hayden	Jail	JCC	Coul	31	1423	270	1	1	0	8664
Hayden	Hayden Junction	JCC	Coul	21	780	152	0	0	0	8592

Table 7 (Cont'd)

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HOUR SAMPLES
GILA (cont'd):										
Hayden	Montgomery Ranch	JCC	Fluor.	44	928	191	0	0	0	8592
Hayden	Montgomery Ranch	State	Fluor.	49	894	200	0	0	0	8221
Hayden	Jail	State	Fluor.	36	1942	269	1	1	0	8300
Miami	Cities Serv.Bldg.	State	Fluor.	17	965	307	0	0	0	6841
Miami	Jones Ranch	State	Fluor.	31	5139	350	4	6	1	7450
Miami	2 mi.SE of Smelter	State	Fluor.	16	648	157	0	0	0	7020
Miami	Burch Pump St.	ICCC	Fluor.	8[c]	903	160	0	0	0	5304
Miami	Town Site	ICCC	Fluor.	12[c]	3320	423	1	1	1	5304
Winkelman	School	JCC	Coul	16	1286	169	0	0	0	8736
Winkelman	1 mi.N Jct.77&177	JCC	Fluor.	46	1674	328	1	1	0	8640
GREENLEE:										
Morenci	Cadillac Point	PD	Coul	74	5206	702	13	16	5	8661
Morenci	Fina Station	PD	Coul	57	1685	435	3	3	1	8731

Table 7 (Cont'd)

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HOUR SAMPLES
GREENLEE (cont'd):										
Morenci	Mobile-Lower Stargo	PD	Coul	71	1721	322	9	9	0	8694
Morenci	Mobile-Buena Vista	PD	Coul	63	2051	731	8	11	3	8655
Morenci	Metcalf	PD	Coul	52	1677	385	6	6	1	8445
Morenci	Standpipe	PD	Coul	56	2672	388	5	5	2	8385
Morenci	Stargo	PD	Coul	85	2706	550	14	15	7	8595
Morenci	Fairbanks	PD	Coul	14	726	139	0	0	0	8715
Morenci	Stargo	State	Fluor.	118	3016	689	34	36	17	8416
Morenci	Cadillac Point	State	Fluor.	88	5222	799	16	18	5	7584
MARICOPA:										
Phoenix	1845 E.Roosevelt	Maricopa	Coul	9[c]	NA	83	NA	NA	0	5110
MOHAVE:										
Bullhead City	224 N.Main St.	SCE	Flame	27	100	41	0	0	0	7468

Table 7 (Cont'd)

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HR. SAMPLES
MOHAVE (cont'd):										
Davis Dam	Katherine Landing	SCE	Flame	28	160	46	0	0	0	8255
Riviera	Ft. Mohave	SCE	Flame	28	148	52	0	0	0	8506
PIMA:										
Ajo	Town Square	PD	Site Temporarily Inactivated.							
Ajo	Oxidation Pond	PD	Site Temporarily Inactivated.							
Ajo	S. Tailings Dam	PD	Site Temporarily Inactivated.							
Ajo	Camelback Mountain	PD	Site Temporarily Inactivated.							
Ajo	Gibson	PD	Site Temporarily Inactivated.							
Ajo	Shelton	PD	Site Temporarily Inactivated.							
Ajo	Miller	PD	Site Temporarily Inactivated.							
Ajo	Hotshot	PD	Site Temporarily Inactivated.							
Ajo	Well Road	State	Fluor.	1	28	28	0	0	0	7769
Redington	E. of Main Ranch	Magma	Fluor.	5	319	53	0	0	0	8018

Table 7 (Cont'd)

1983 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF 1-HR. SAMPLES
PIMA (cont'd):										
Tucson	32 N. Stone	PD	Coul	1[c]	31	5	0	0	0	4171
Tucson	1721 N.Tanque Verde	Pima	Fluor.	5[c]	79	79	0	0	0	5950
Tucson	22nd & Craycroft	Pima	Fluor.	3	341	210	0	0	0	8330
PINAL:										
Kearny	202 Hammond Drive	JCC	Coul	14	851	111	0	0	0	8184
Mammoth	Courthouse	Magma	Fluor.	7	626	96	0	0	0	8617
Oracle	Courthouse	Magma	Fluor.	10	926	150	0	0	0	8677
San Manuel	Townsite	Magma	Fluor.	49	1484	264	1	1	0	8703
San Manuel	Golf Course	Magma	Fluor.	49	2679	416	1	2	1	8698
San Manuel	Dormsite	Magma	Fluor.	51	1288	295	0	0	0	8711
San Manuel	Minesite	Magma	Fluor.	45	1506	345	1	1	0	8711
San Manuel	LDS Church	State	Fluor.	34	1243	224	0	0	0	8412
Winkelman	1 mi.S Jct.77 & 177	JCC	Coul	10	590	104	0	0	0	8616

STATE AND FEDERAL STANDARDS (ug/m^3):	Annual Average	24-Hr. Average	3-Hr. Average
Primary	80	365	-
Secondary	-	-	1300

Table 8

1983 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
COCHISE:					
Bisbee	Warren City Hall	State	2.1	34.9	54
Douglas	City Park	State	2.1[c]	3.7	22
Douglas	1.2 mi.N. of Smelter	State	1.4	3.0	56
Paul Spur	Housing Area	State	1.7[c]	3.4	41
Sierra Vista	Bartow Drive	State	1.8	5.2	53
COCONINO:					
Flagstaff	218 N. Leroux Street	State	2.1	4.9	46
Grand Canyon	Hopi Point	State	1.4[c]	3.1	27
Page	Airport	State	2.1	6.7	59
GILA:					
Hayden	Jail	State	2.2	4.5	53
Miami	Fire Station	State	2.5	4.7	55
GRAHAM:					
Safford	523 10th Avenue	State	2.1	4.6	56

Table 8 (Cont'd)

1983 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIUM 24-HOUR AVERAGE	NO. OF SAMPLES
GREENLEE:					
Morenci	Stargo	State	1.6	4.5	45
MARICOPA:					
Glendale	6000 W. Olive Avenue	Maricopa	3.9[c]	15.3	35
Mesa	Broadway & Brooks	Maricopa	3.5[c]	10.0	37
Phoenix	1845 E. Roosevelt	Maricopa	3.6[c]	13.0	34
Phoenix	4732 S. Central	Maricopa	3.5[c]	10.4	34
Phoenix	8531 N. 6th Street	Maricopa	4.0[c]	8.7	38
Phoenix	1826 W. McDowell	Maricopa	3.9[c]	15.5	36
Phoenix[a,b]	4202 W. Belleview	Maricopa	3.2[c]	5.1	17
Scottsdale	2857 N. Miller Road	Maricopa	3.1[c]	7.4	37
Scottsdale	13665 N. Scottsdale Road	Maricopa	Site Temporarily Inactivated,		
NAVAJO:					
Joseph City	3.25 mi. SE of Town	State	1.8	3.6	47
Show Low	Deuce of Clubs Avenue	State	1.7	5.6	54

Table 8 (Cont'd)

1983 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
PIMA:					
Ajo	Well Road	State	2.0	5.3	58
Organ Pipe (N.M.)	Visitors Center	State	1.6	5.7	51
Rillito	Miller's Market	State	3.3[c]	6.9	34
Tucson	Irvington & Alvernon	TEP	1.1	2.4	55
Tucson	1/2 mi. E of Irvington & Alvernon	TEP	1.4	4.4	50
PINAL:					
San Manuel	LDS Church	State	1.8	4.8	59
SANTA CRUZ:					
Nogales	U. S. Post Office	State	3.6[c]	29.5	43
YAVAPAI:					
Clarkdale	Fire Station	State	1.8	4.8	58
Montezuma Castle (N.M.)	Maint. Building	State	1.6	4.4	50

Table 8 (Cont'd)

1983 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
YAVAPAI (cont'd):					
Nelson	1 mi. N of Lime Plant	State	1.3	5.2	53
Prescott	Co. Maint. Yard	State	2.1	6.9	50
YUMA:					
Yuma	201 S 2nd Avenue	State	5.0	16.7	53

Table 9

1983 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
APACHE:					
Springerville	Airport	TEP	1.6	7	354
Springerville	4 mi.N.E. of Town	TEP	1.2	8	345
COCHISE:					
Bisbee	Warren City Hall	State	3.1	11.8	58
Douglas	1.2 mi. N. of Smelter	State	8.4	31.1	56
Douglas	City Park	State	7.9[c]	42.5	22
Paul Spur	Housing Area	State	10.5[c]	24.6	41
Sierra Vista	Bartow Drive	State	4.4	10.9	53
COCONINO:					
Flagstaff	218 N. Leroux Street	State	2.1	3.6	46
Grand Canyon	Hopi Point	State	1.4[c]	2.9	27
Page	Airport	State	2.9	5.9	59
GILA:					
Hayden	Jail	State	8.6	16.6	53
Miami	Fire Station	State	7.3	16.8	55

Table 9 (Cont'd)

1983 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
GRAHAM:					
Safford	523 10th Avenue	State	5.2	10.0	56
GREENLEE:					
Morenci	Stargo	State	8.9	21.1	45
MARICOPA:					
Glendale	6000 W. Olive Avenue	Maricopa	4.3	8.5	52
Mesa	Broadway & Brooks	Maricopa	4.2	9.0	58
Phoenix	1845 E. Roosevelt	Maricopa	5.3	10.0	53
Phoenix	4732 S. Central	Maricopa	4.9	12.2	50
Phoenix	8531 N. 6th Street	Maricopa	5.4	10.7	55
Phoenix	1826 W. McDowell	Maricopa	5.1	10.8	48
Phoenix[a,b]	4202 W. Belleview	Maricopa	5.3[c]	10.9	27
Scottsdale	2857 N. Miller Road	Maricopa	5.4	10.0	52
Scottsdale	13665 N. Scottsdale Road	Maricopa	Site Temporarily Inactivated.		

Table 9 (Cont'd)

1983 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
NAVAJO:					
Joseph City	3.25 mi. S.E. of Town	State	4.1	7.9	47
Show Low	Deuce of Clubs Avenue	State	2.7	6.8	54
PIMA:					
Ajo	Well Road	State	3.1	17.2	58
Corona de Tucson	22000 S. Houghton	Pima	3.4[c]	7.4	24
Green Valley	245 W. Esperanza	Pima	3.5[c]	6.5	24
Organ Pipe (N.M.)	Visitors Center	State	1.8	6.8	51
Rillito	Miller's Market	State	6.3[c]	11.4	34
Tucson	3915 E. Ft. Lowell Rd.	Pima	5.0[c]	10.9	24
Tucson	151 W. Congress	Pima	4.9[c]	8.8	24
Tucson	1810 S. 6th Avenue	Pima	5.3[c]	11.8	24
Tucson	3401 W. Orange Grove Rd.	Pima	5.0[c]	10.4	24
Tucson	1016 W. Prince Rd.	Pima	5.3[c]	9.5	22
Tucson	Irvington & Alvernon	TEP	2.4	5.9	55

Table 9 (Cont'd)

1983 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
PIMA (cont'd):					
Tucson	1/2 mi. E. of Irvington & Alvernon	TEP	3.3	19.4	50
PINAL:					
San Manuel	LDS Church	State	8.7	19.9	59
SANTA CRUZ:					
Nogales	U. S. Post Office	State	5.5[c]	10.2	43
YAVAPAI:					
Clarkdale	Fire Station	State	2.6	6.3	58
Montezuma Castle (N.M.)	Maint. Building	State	1.9	4.1	50
Nelson	1 mi. N. of Lime Plant	State	2.0	4.6	53
Prescott	Co. Maint. Yard	State	2.1	6.6	50
YUMA:					
Yuma	201 S. 2nd Avenue	State	3.8	7.8	53

APPENDIX B Air Quality Trends

Carbon Monoxide

There were no significant changes in 8-hour concentrations at the 1845 East Roosevelt Street site in 1983. In fact, carbon monoxide levels have tended to level out at this neighborhood scale site since 1978, as indicated by Figure 2. From 1974 through 1977, however, concentrations declined appreciably from a second highest value of 23 m/m^3 to 15 mg/m^3. Similar patterns are evident in a plot of the number of exceedances of the 8-hour standard in Figure 5.

It should be noted that data for the 1845 East Roosevelt Street site have been used to indicate long-term trends because of the extensive historical data available and due to the central location of this monitoring site. However, higher neighborhood scale concentrations are found in west Phoenix due to prevailing easterly winds at night when temperature inversions develop. Unfortunately, no long-term data for a single site in west Phoenix are available.

In regard to one-hour concentrations of carbon monoxide, no exceedances of the one-hour standard (40 mg/m^3) were detected from 1973 through 1982. However, in 1983, one exceedance (42 mg/m^3) was measured at the 3315 West Indian School Road site, a microscale site. In fact, this site came very close to monitoring a violation with a second highest one-hour reading of 39 mg/m^3.

In Tucson, variations from year to year in eight-hour concentrations were different than those observed in Phoenix, especially in 1977 and 1978. (See Figure 3.) A sharp decrease in concentrations was recorded in Tucson in 1977, whereas, carbon monoxide levels increased in Phoenix (see Figure 2). In 1978, the trends reversed, resulting in higher readings in Tucson and lower readings in Phoenix. These discrepancies could be due to differences in meteorology or due to low data recovery (64%) in 1977 at the Tucson site, 22nd Street and Alvernon.

The long-term trend in Tucson, however, is the same as in Phoenix, that is, decreasing concentrations from 1975 through 1978, after which concentrations are fairly constant. As in Phoenix, this pattern is also reflected in the number of exceedances of the eight-hour standard in Tucson (see Figure 5).

Phoenix and Tucson carbon monoxide data are compared with NAMS (National Air Monitoring Stations) data in Figures 4 and 5. The NAMS data represent the average values obtained from 41 sites throughout the United States. EPA reviews NAMS data annually to evaluate trends and to compare different regions. It can be seen that the NAMS values are the lowest with the exception of the number of exceedances, in which case they are in between Phoenix and Tucson.

In Prescott, Sierra Vista and Yuma, no significant changes in carbon monoxide levels are apparent (see Figure 6). In contrast, Flagstaff concentrations appear to have declined from 1978 to 1982, followed by no change in 1983. Based on these trends, it appears that violations of the eight-hour standard are not likely in the near future in these cities.

Lead

After decreasing for a number of years, lead concentrations in Phoenix and Tucson appear to be stabilizing (see Figure 7). This leveling trend appears to have developed first in Tucson in 1981, then in Phoenix in 1982. Compliance with the quarterly standard, 1.5 ug/m^3, was achieved in 1981 in Phoenix, whereas, in Tucson no violations of the standard have been monitored.

Another interesting feature of these data is the increasing ratio of lead concentrations at the Tucson site (1016 West Prince Road) to lead concentrations at the Phoenix site (1845 East Roosevelt). In 1978, this ratio of the highest quarterly average concentrations was 0.43, but by 1983, the ratio had steadily increased to 0.93. The 1845 East Roosevelt Street and 1016 West Prince Road sites were chosen for comparison because they monitor the highest neighborhood scale lead concentrations. Higher concentrations in Phoenix are detected at 1826 West McDowell Road, a new site near the six-way intersection of McDowell, Grand Avenue and 19th Avenue. However, at this site the maximum quarterly average concentration in 1983, 1.1 ug/m^3, was below the standard. The NAMS data which represent 46 sites also exhibit a downward trend with concentrations less than in Phoenix and Tucson.

Nitrogen Dioxide

Nitrogen dioxide data trends for Phoenix and Tucson are difficult to interpret due to the large variations from year to year in the annual average concentrations (see Figure 8). This is especially noticeable in the Phoenix data for the years 1980 and 1983 when the annual mean levels were unusually low, particularly in 1980. The most likely reason for these ambiguous data is low data recovery. At any rate, it does appear that Phoenix and Tucson are well within compliance of the annual standard, 100 ug/m^3. A smoother trend curve is obtained from the NAMS values which represent 14 sites.

Ozone

A plot of the maximum and second highest one-hour concentrations in Figure 9 suggests a slight upward trend in both Phoenix and Tucson. As a result, the only exceedance of the standard in Tucson was monitored in 1982. A comparison with NAMS data for 64 sites indicates that Phoenix and the average NAMS site are monitoring comparable ozone levels, whereas Tucson concentrations are lower (Figure 10). Figure 11 illustrates the spatial variability in the number of ozone exceedances in Phoenix. It does appear that the greatest number of exceedances occurs at the Roosevelt Street site. Accordingly, the Roosevelt Street data were compared with NAMS data in Figure 12 which shows that the average NAMS site records a much greater number of exceedances each year. However, a downward trend in the NAMS data is apparent.

In Flagstaff, Prescott and Sierra Vista, no significant change in the highest ozone concentrations during the last five years is evident (see Figure 13). Second highest one-hour concentrations of 0.06 ppm to 0.10 ppm have been monitored in these three cities. On the other hand, an upward trend in Yuma is indicated by an increase from 0.08 ppm in 1979 to 0.11 ppm in 1983. As a result, concentrations were higher in Yuma than in the other three cities in 1983.

Particulates

A decreasing trend in annual mean levels in Phoenix is reflected in the data in Figure 14. At the South Central Avenue site (4732 South Central Avenue) this change is especially noticeable, but the annual mean concentration in 1983 was still above the standard. However, at the Mesa site compliance with the annual standard was achieved in 1982 and maintained in 1983. Although the Mesa site is the only site meeting the annual standard, the Glendale site (6000 West Olive Avenue) and the Scottsdale site (2857 North Miller Road) are approaching attainment.

In regard to the 24-hour standards, no exceedances of the primary standard were detected in 1983 at the six trend sites reviewed in Figure 14, the first time this has ever occurred. Attainment of the primary standard was achieved in 1982 when only one exceedance occurred. Concerning the secondary standard, there were 36 exceedances in 1983, essentially the same as in 1982 when 32 exceedances were recorded. In Figure 15 a comparison shows that the NAMS trend parallels the Phoenix downward trend, but that concentrations at the Phoenix site are higher.

In Tucson particulate concentrations also continued to decline in 1983, resulting in another site (3915 East Ft. Lowell Road) attaining the annual standard (see Figure 16). As it now stands, eight of the 11 monitoring stations included in Figure 16 are complying with the annual standard. At the three other sites,where concentrations are steadily decreasing, attainment of the standard is likely in 1984. An additional sign of improvement was noted in the number of exceedances of the secondary 24-hour standard, down to five in 1983, contrasted with eight in 1982. Futhermore, there were no exceedances of the primary 24-hour standard in 1983, whereas one exceedance was monitored in 1982. The NAMS data track very closely in trend and concentration level with Tucson data, as shown in Figure 17.

In most other areas of the state, particulate concentrations did not vary appreciably from 1982 values (see Table 10). However, at a few sites including Grand Canyon, Hayden and Organ Pipe, annual mean levels were much lower in 1983, the second consecutive year in which substantial decreases have been monitored at these sites. Over the past four to five years, a gradual downward trend is noticeable in the Ajo, Green Valley, Joseph City, Miami, Safford and Show Low data.

Sulfur Dioxide

Substantial reductions in annual average concentrations in 1983 were recorded in four copper smelter cities: Ajo, Hayden, Miami and San Manuel (see Figure 18). As a result, Hayden attained the annual standard for the first time and by a comfortable margin. It was the second consecutive year in Hayden in which large decrements in sulfur dioxide levels were monitored. On the other hand, the sulfur dioxide average level at Morenci increased considerably from 42 ug/m^3 to 118 ug/m^3 in 1983. Consequently, Morenci was the only area in which violations of the annual standard were detected in 1983. It should be noted that the Ajo monitor at the Oxidation Pond site was not operated by Phelps Dodge in 1983 because the smelter in Ajo was shut down. The State monitor (Well Road) nearby which was in service recorded an annual average of only 1 ug/m^3.

In regard to exceedances of the three and 24-hour standards, a downward trend occurred during the past five years except at Morenci (see Figure 19). At Hayden this decrease in short-term exceedances was especially substantial, resulting in attainment of all sulfur dioxide standards in 1983. However, sizable increases in the number of short-term exceedances were monitored in Morenci last year. In fact the number of three-hour exceedances, 93, was the greatest amount since 1976 when 101 exceedances were recorded in Morenci.

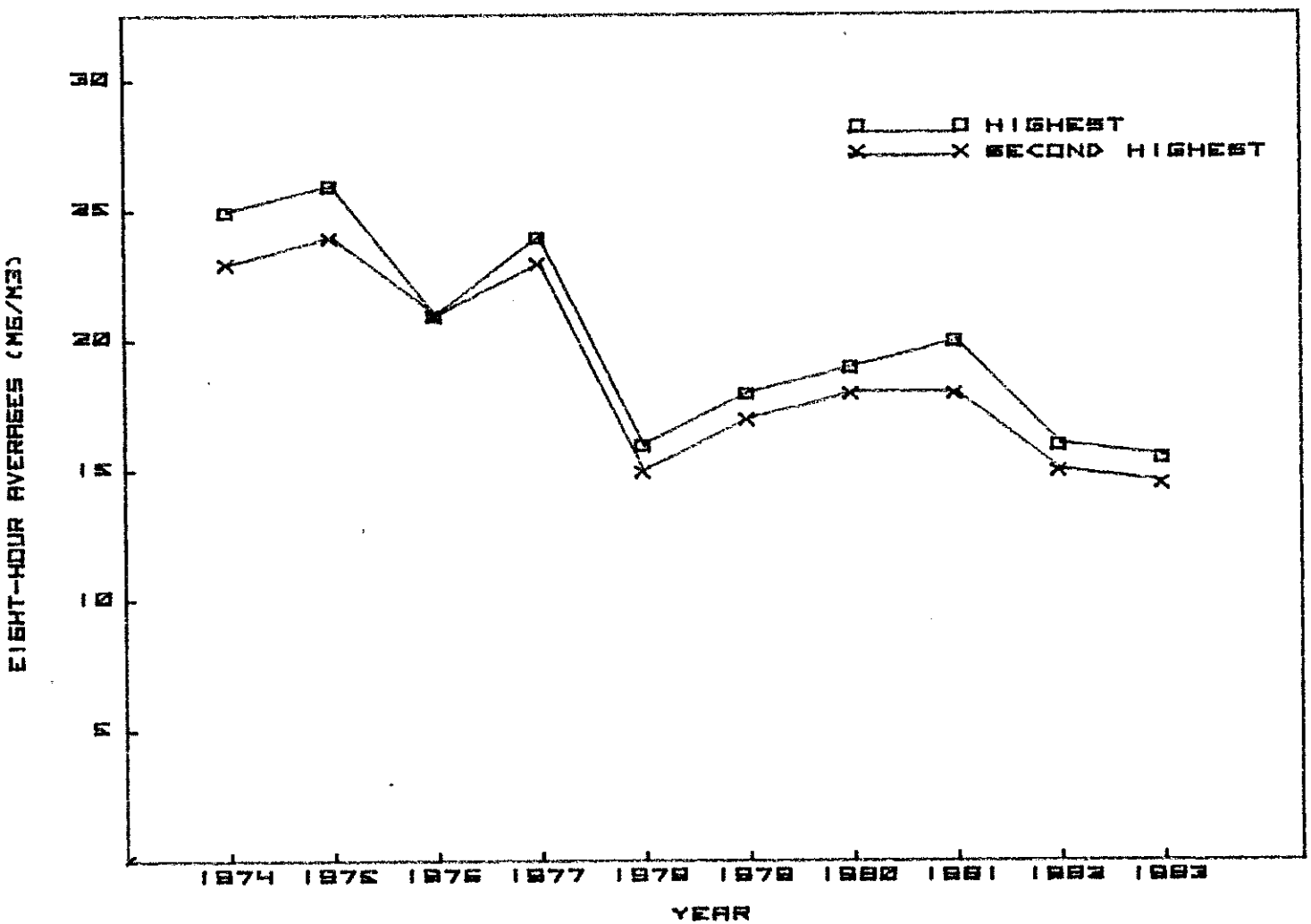

FIGURE 2. AVERAGE EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS IN PHOENIX (1845 E. ROOSEVELT), FROM 1974 TO 1983.

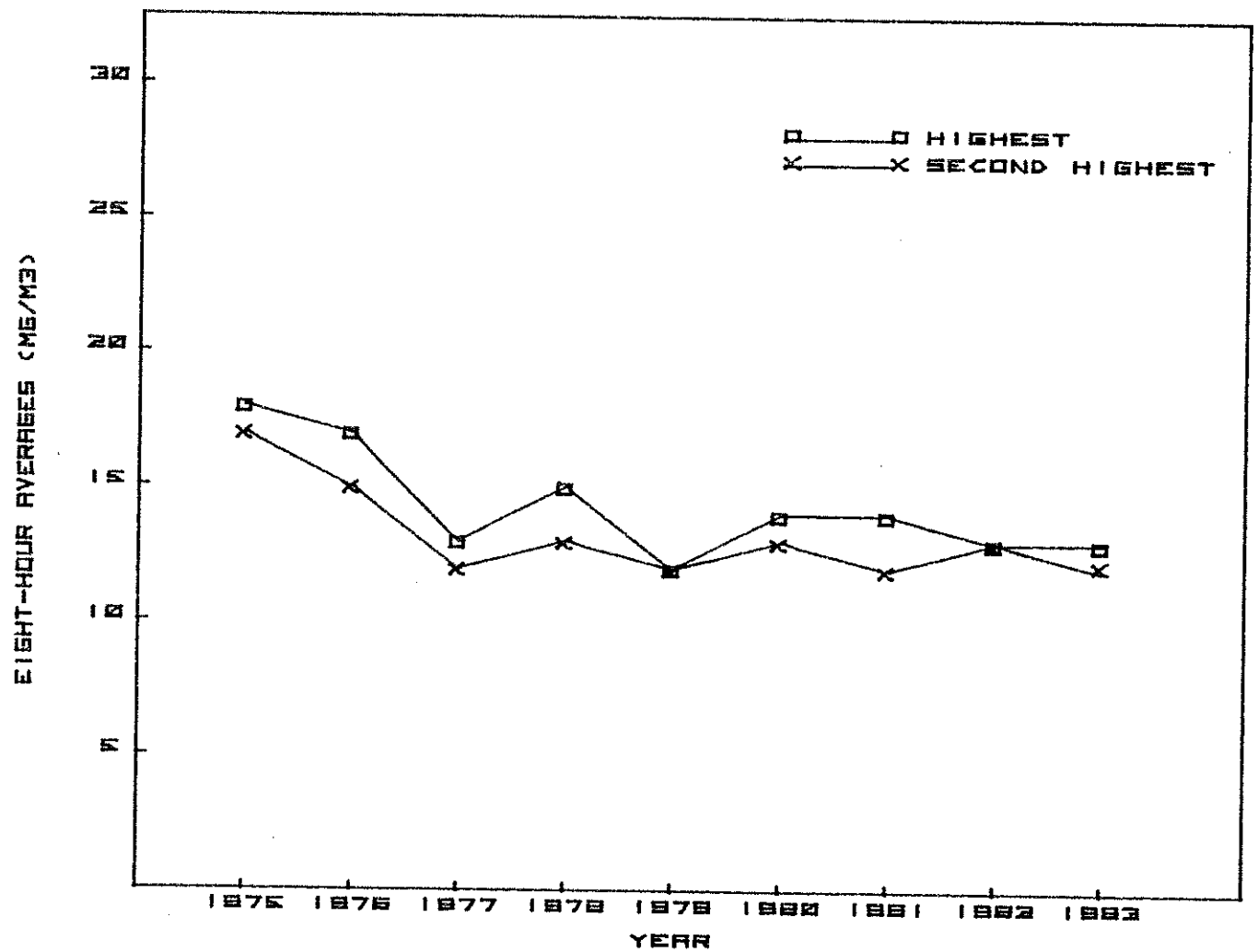

FIGURE 3. AVERAGE EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS IN TUCSON (22ND ST. & ALVERNON), FROM 1975 TO 1983.

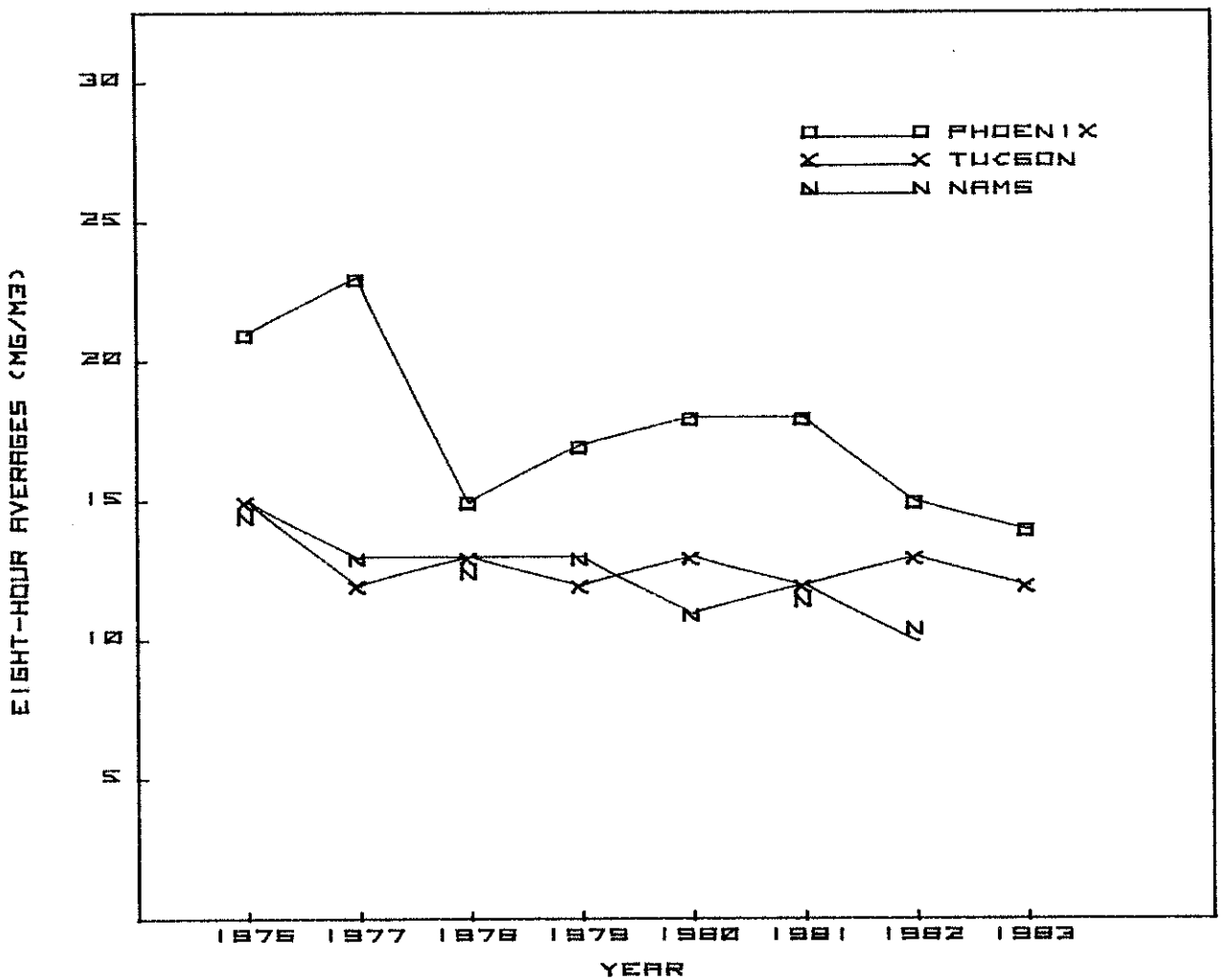

FIGURE 4. SECOND HIGHEST AVERAGE EIGHT-HOUR CARBON MONOXIDE CONCENTRATIONS IN PHOENIX AND TUCSON COMPARED TO NAMS DATA FROM 1975 TO 1983.

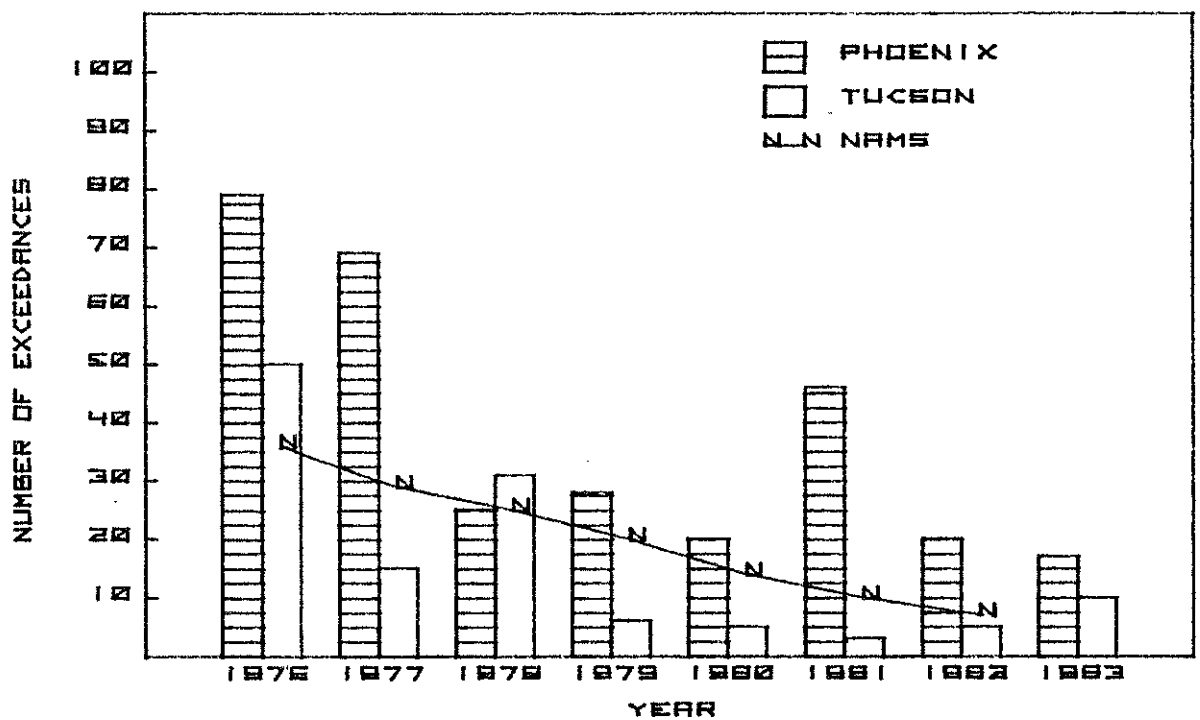

FIGURE 6. NUMBER OF EIGHT-HOUR CARBON MONOXIDE EXCEEDANCES IN PHOENIX AND TUCSON COMPARED TO NAMS DATA.

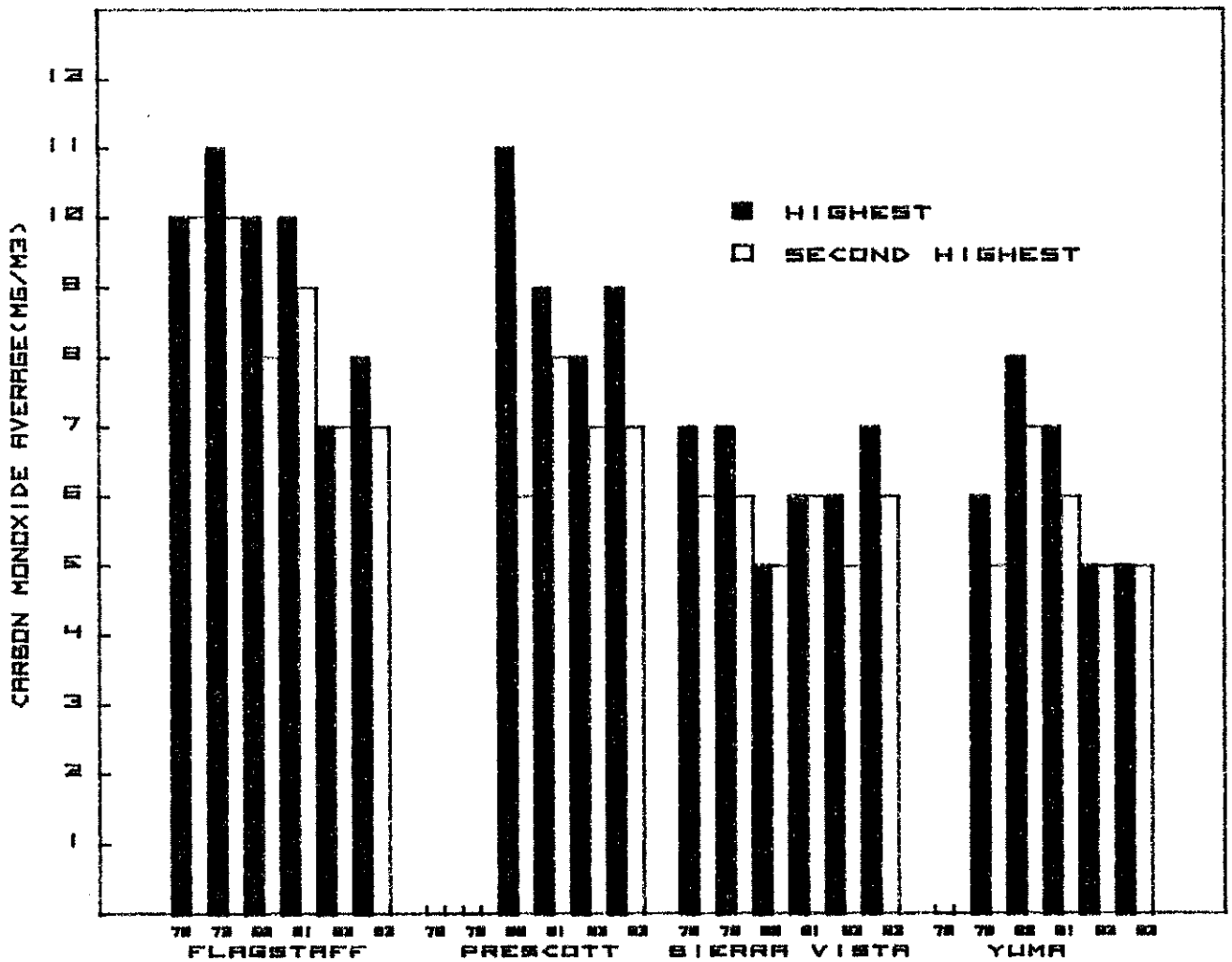

FIGURE 8. CARBON MONOXIDE AVERAGE EIGHT-HOUR CONCENTRATIONS IN FLAGSTAFF, PRESCOTT, SIERRA VISTA, AND YUMA.

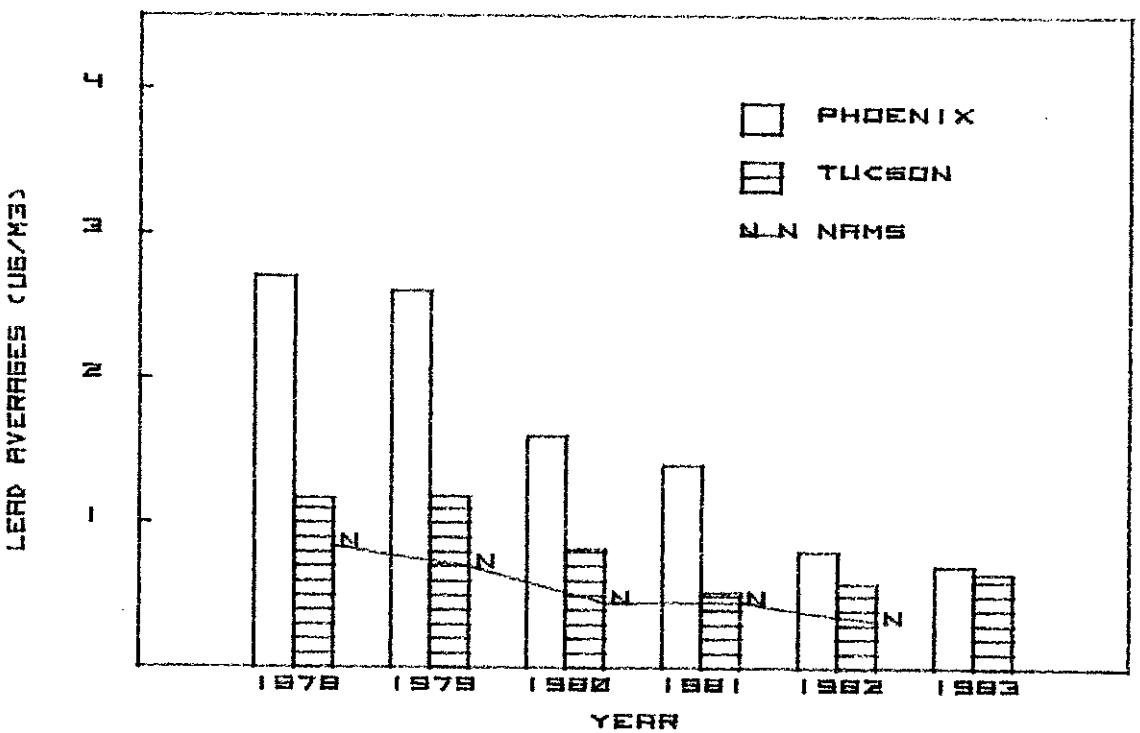

FIGURE 7. MAXIMUM QUARTERLY AVERAGE LEAD CONCENTRATIONS IN PHOENIX (1845 E ROOSEVELT) AND TUCSON (1915 W. PRINCE) COMPARED TO NAMS DATA.

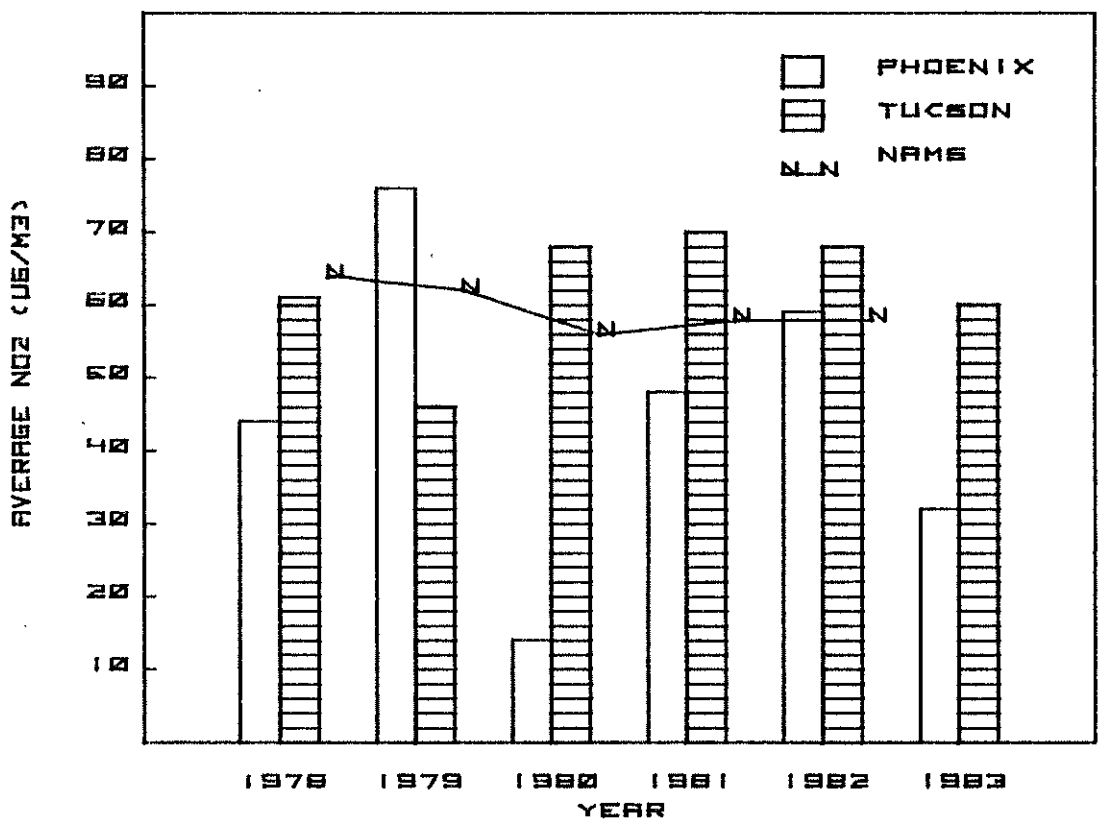

FIGURE B. NITROGEN DIOXIDE ANNUAL AVERAGE CONCENTRATION IN PHOENIX (1845 E. ROOSEVELT) AND TUCSON (151 W. CONGRESS) COMPARED TO NAMS DATA.

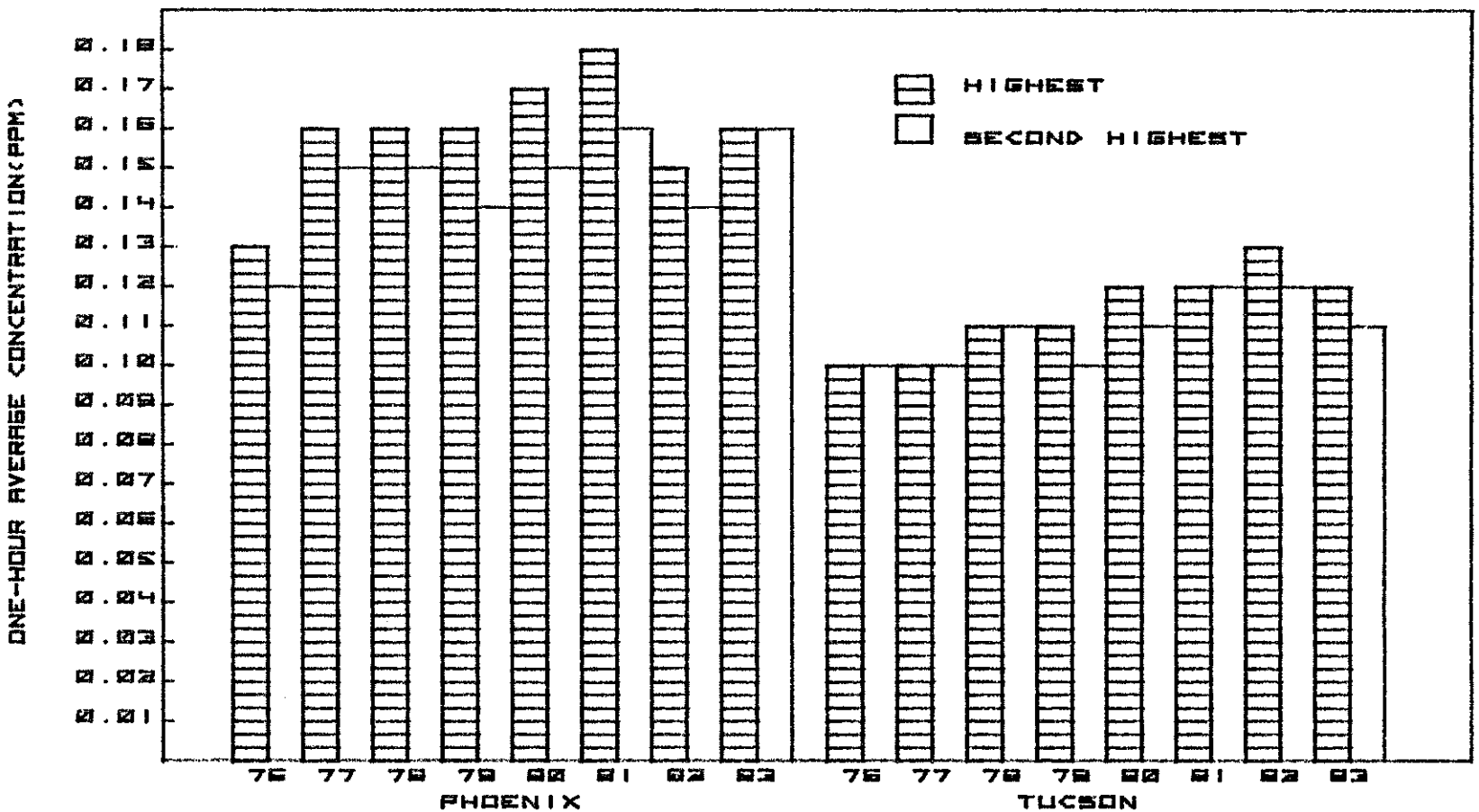

FIGURE 8. HIGHEST AND SECOND HIGHEST ONE-HOUR AVERAGE OZONE CONCENTRATIONS IN PHOENIX AND TUCSON FROM 1976 THROUGH 1983.

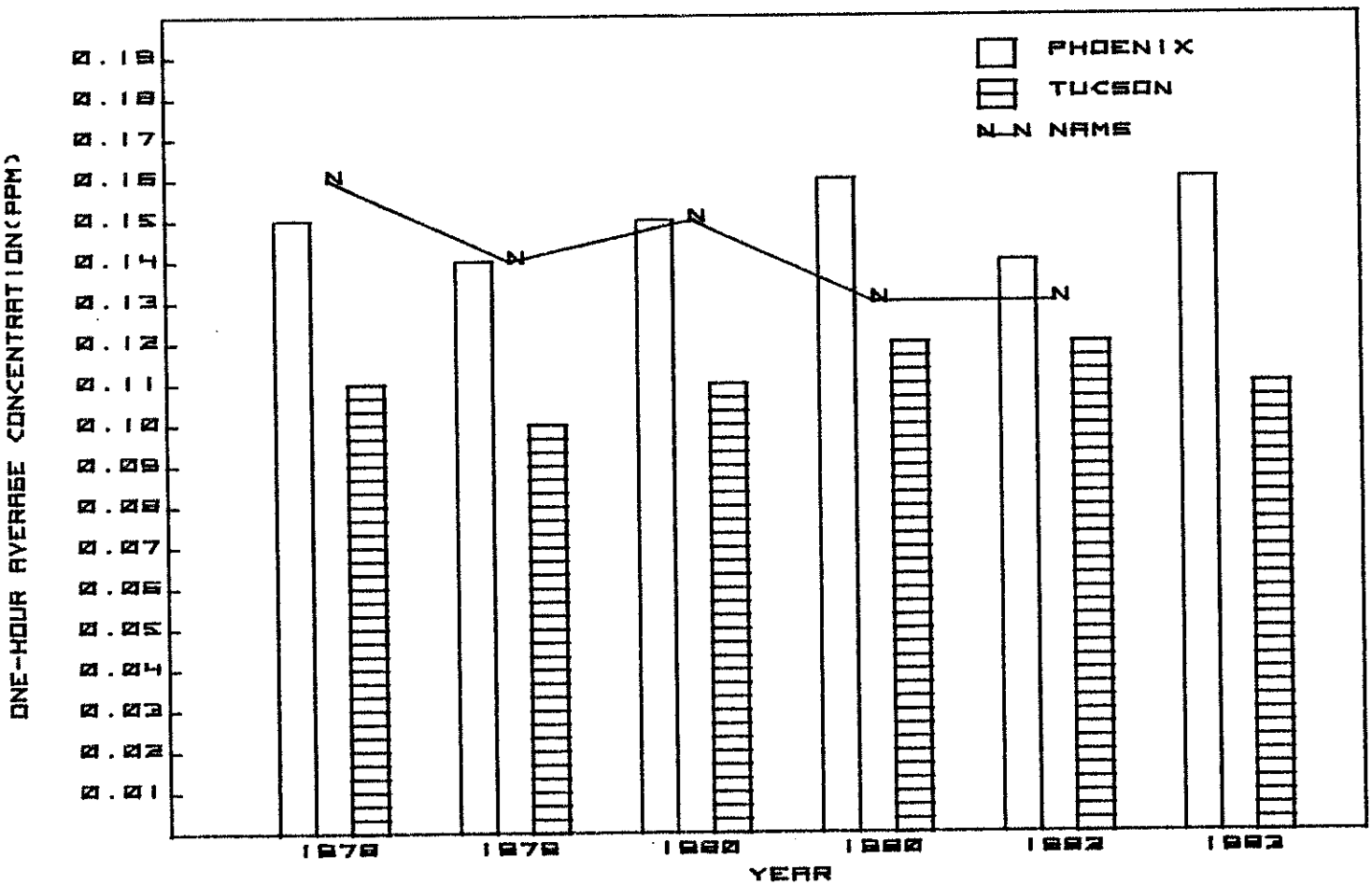

FIGURE 10 SECOND HIGHEST ONE-HOUR AVERAGES OF OZONE CONCENTRATIONS IN PHOENIX AND TUCSON FROM 1978 THROUGH 1982 COMPARED TO NAMS DATA.

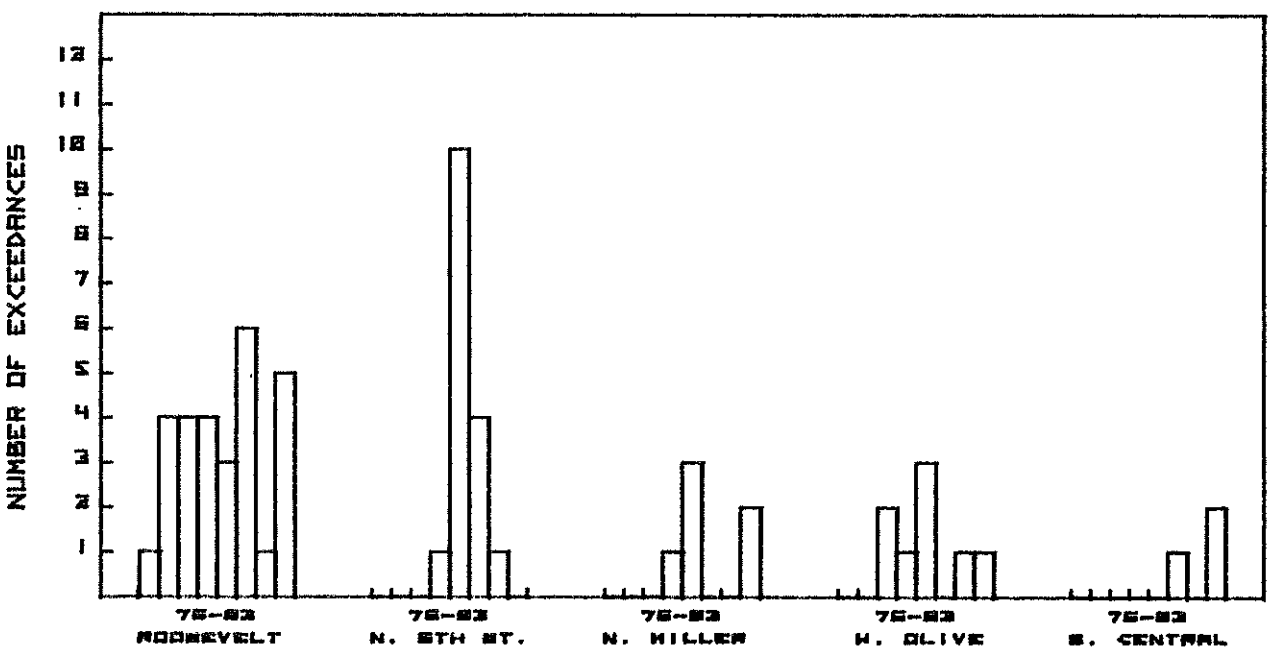

FIGURE 11. NUMBER OF ONE-HOUR OZONE EXCEEDANCES IN PHOENIX AT FIVE SITES: 1845 E. ROOSEVELT, 8531 N. 6TH ST., 2857 N. MILLER RD., 6000 W. OLIVE, AND, 4732 S. CENTRAL.

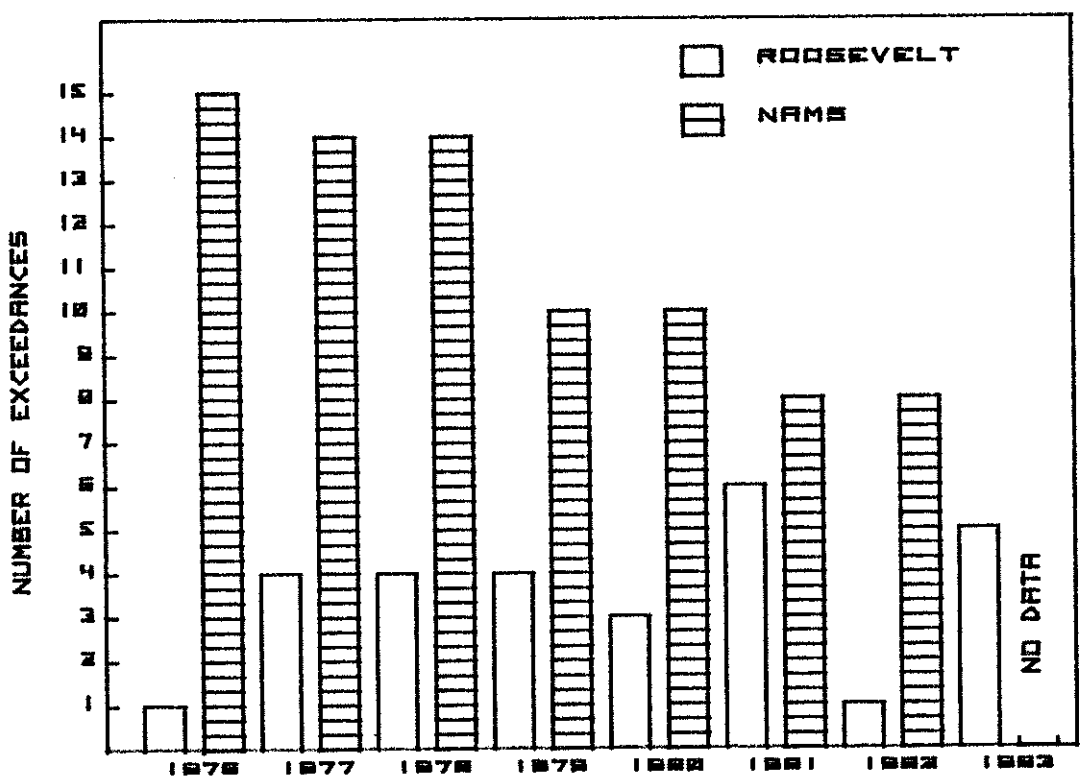

FIGURE 12. NUMBER OF ONE-HOUR OZONE EXCEEDANCES IN PHOENIX AT 1845 E. ROOSEVELT COMPARED TO NAMS AVERAGES.

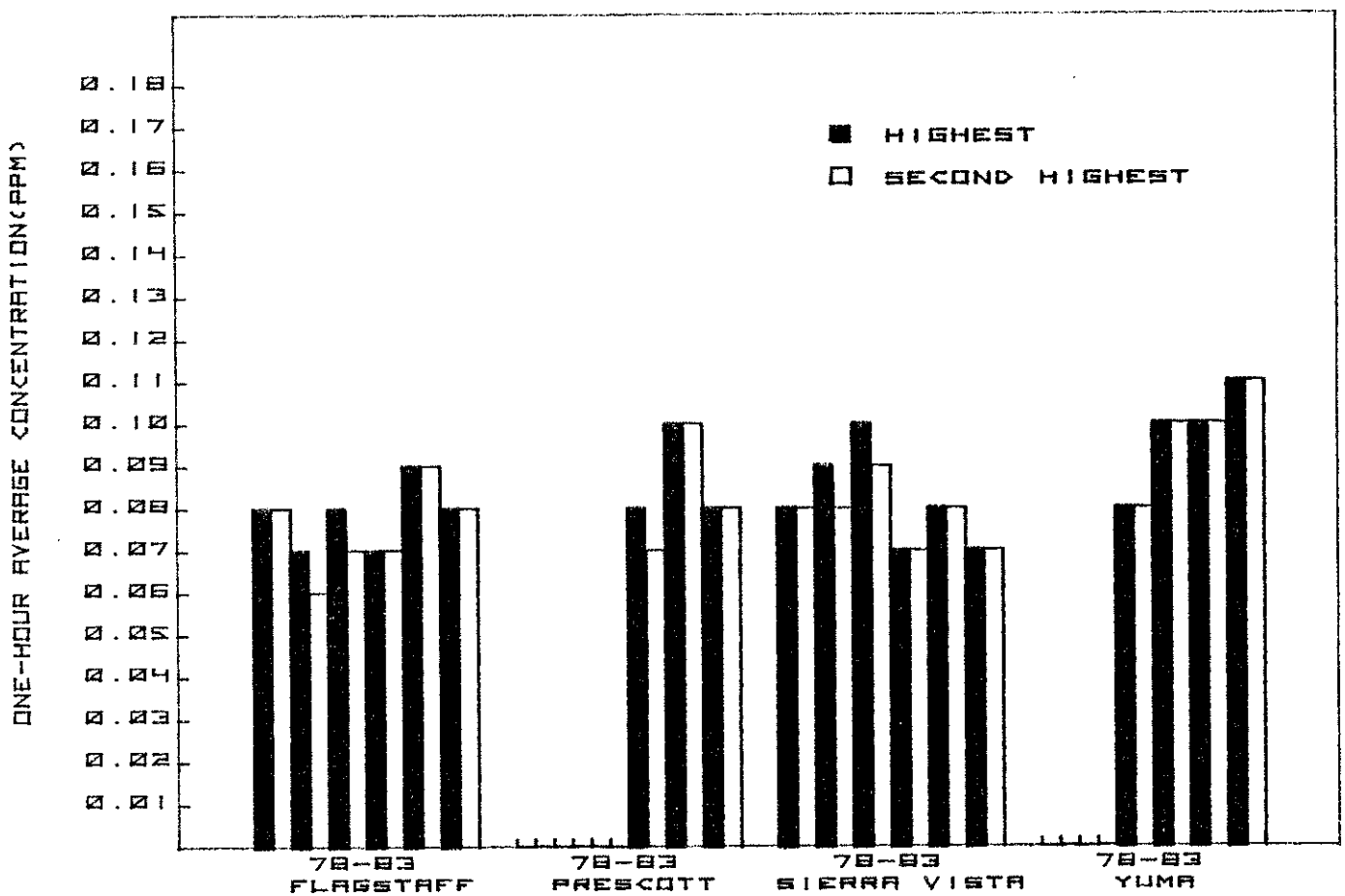

FIGURE 13. HIGHEST AND SECOND HIGHEST ONE-HOUR OZONE CONCENTRATIONS IN FLAGSTAFF, PRESCOTT, SIERRA VISTA, AND, YUMA.

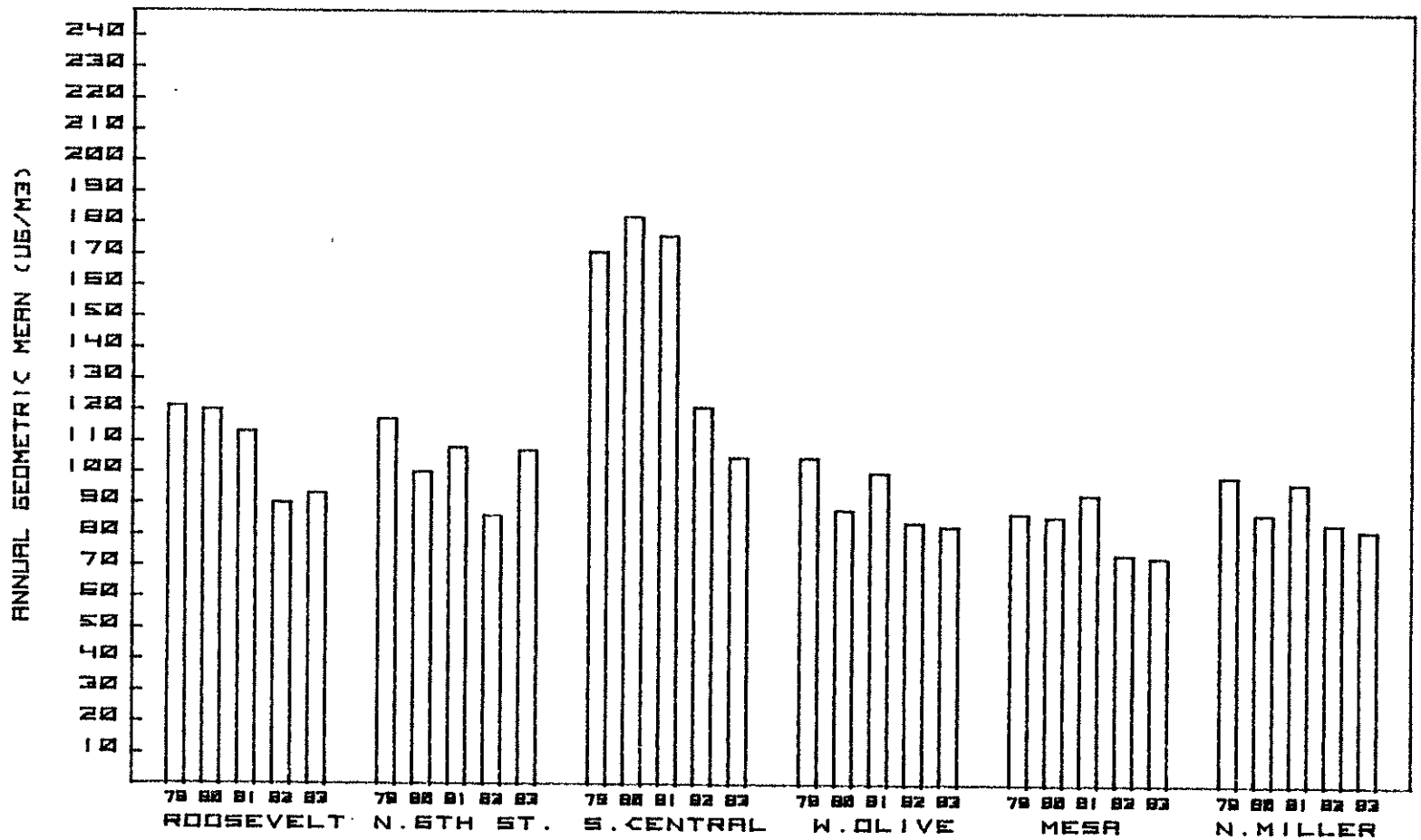

FIGURE 14. SUSPENDED PARTICULATE ANNUAL GEOMETRIC MEAN IN PHOENIX AT 1845 E. ROOSEVELT, 8531 N. 6TH ST., 4732 S. CENTRAL, 6000 W. OLIVE (GLENDALE), BROADWAY AND BROOKS (MESA), AND 2857 N. MILLER (SCOTTSDALE).

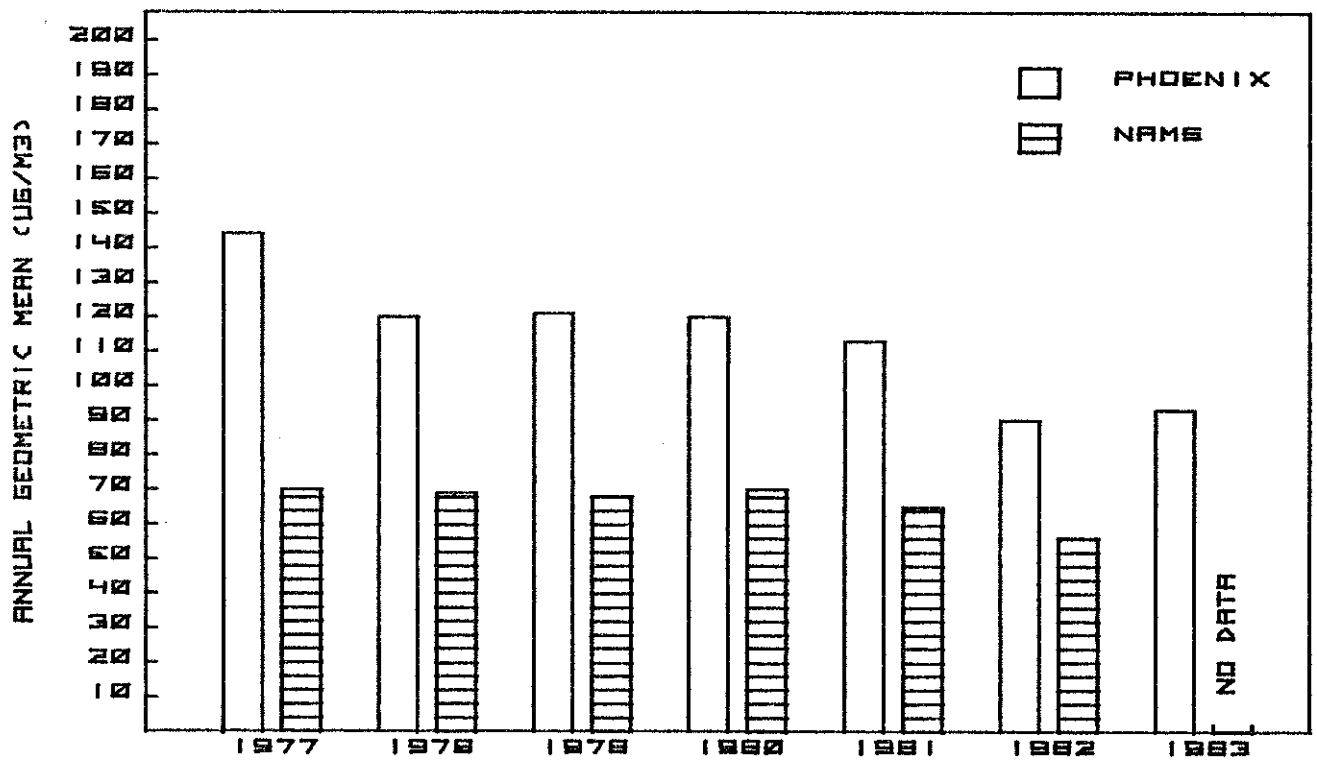

FIGURE 15. SUSPENDED PARTICULATE ANNUAL GEOMETRIC MEAN IN PHOENIX AT 1845 E. ROOSEVELT, COMPARED TO NAMS DATA.

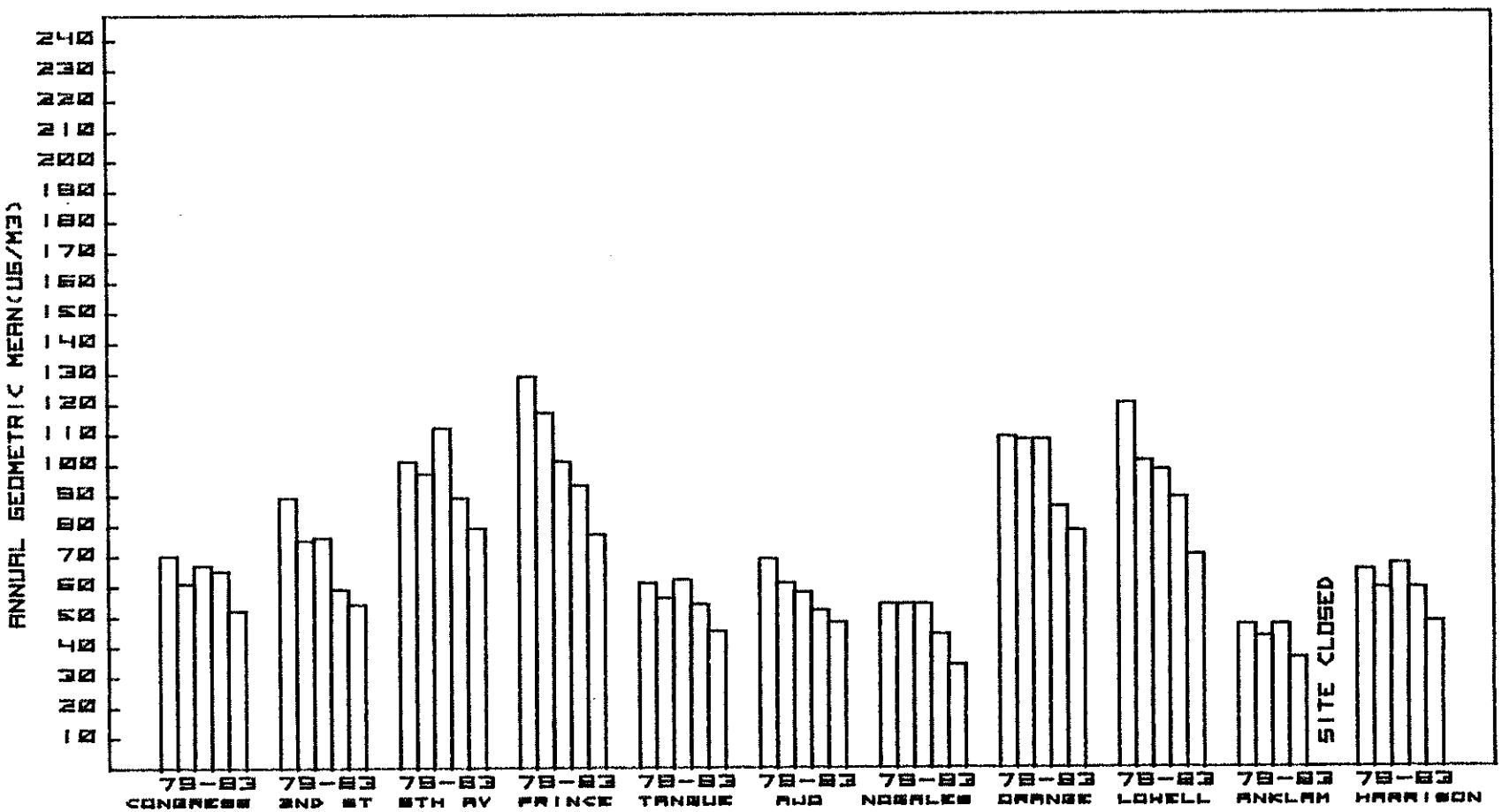

FIGURE 16. SUSPENDED PARTICULATE ANNUAL GEOMETRIC MEANS IN TUCSON AT 151 W. CONGRESS, 2ND ST. AND PALM, 1810 S. 6TH AVE., 1015 W. PRINCE RD., 7920 E. TANQUE VERDE, 1970 W. AJO WAY, 8100 S.NOGALES HWY., 3401 W. ORANGE GROVE RD., 3915 E. FT. LOWELL RD., 2202 W. ANKLAM RD., 2151 S. HARRISON RD.

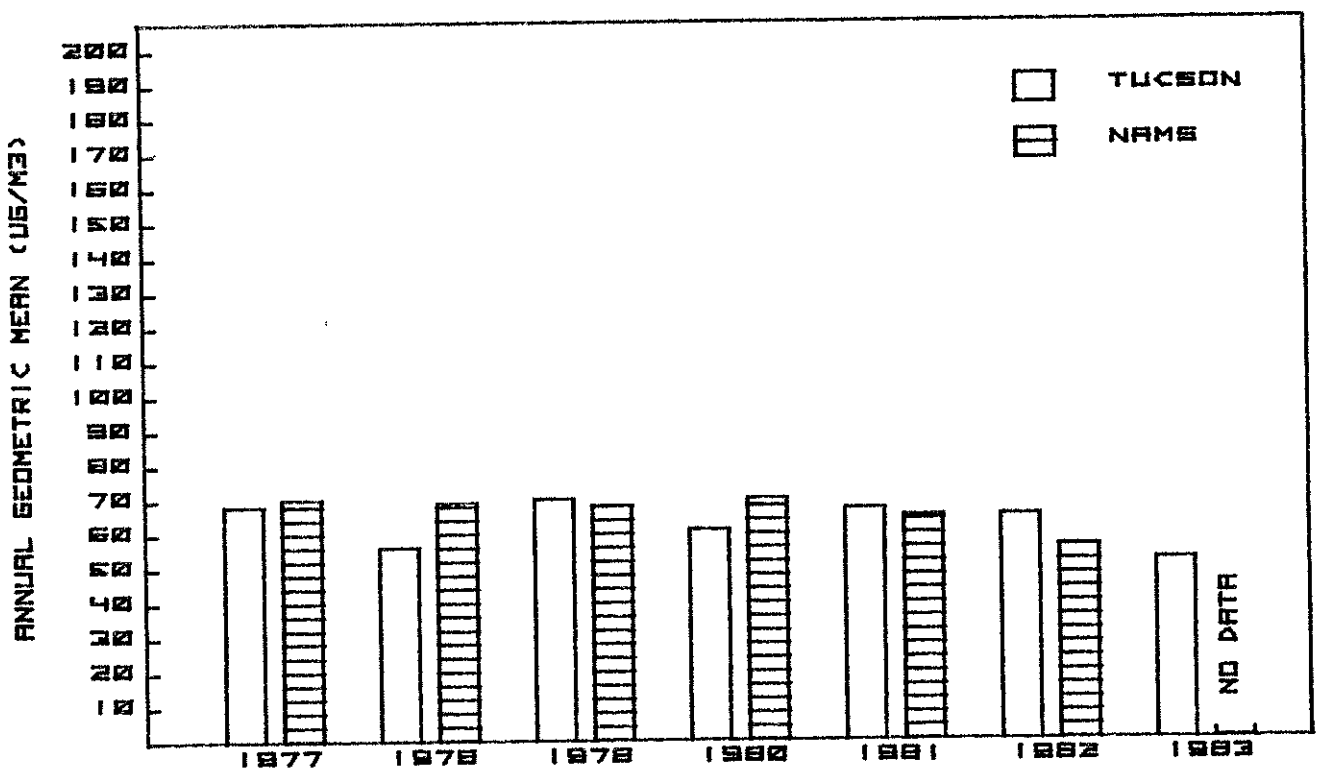

FIGURE 17. SUSPENDED PARTICULATE ANNUAL GEOMETRIC MEAN IN TUCSON AT 151 W. CONGRESS, COMPARED TO NAMS DATA.

Table 10

Particulate Concentrations in Various Cities

Site	Annual Geometric Mean Concentration (ug/m^3)						
	1977	1978	1979	1980	1981	1982	1983
Ajo	72[C]	69	67[C]	85	86	68	56
Bullhead City	83	71	75	66	87	70	84
Douglas (U.S. 666)	46	20[C]	48	57	65[C]	54	46
Douglas (City Park)	82	74	121	136	128[C]	90[C]	91[C]
Flagstaff	79[C]	104[C]	82	81[C]	81	77[C]	68
Grand Canyon-Hopi Pt.	--	--	22	11[C]	16	12	5
Green Valley	56	45	54	39	46	33	27
Hayden	92[C]	134[C]	172	152[C]	287	132	98
Joseph City	55	35	40	37	34	30	27
Kansas Settlement	--	--	38	41	44	31	32
Miami	99[C]	85	118	86	75	69	70
Morenci	47[C]	37	55	50	55[C]	35	43
Organ Pipe (N.M.)	33	28[C]	31	36[C]	34	24	16
Page	37	25[C]	31	36[C]	38	36	31
Paul Spur	--	--	395	381	354[C]	303	284[C]
Rillito	143[C]	100	132	114	112	107[C]	105[C]
Safford	143[C]	123	159	125	107	107	95
San Manuel	50	26	30	29	49	36	33
Show Low	64	70	93	62	66	47	49
Sierra Vista	63[C]	53	65	52[C]	53	45	48
St. Johns	--	21[C]	19	24	23	19	22
Yuma	133	112[C]	139	126	121	90	107

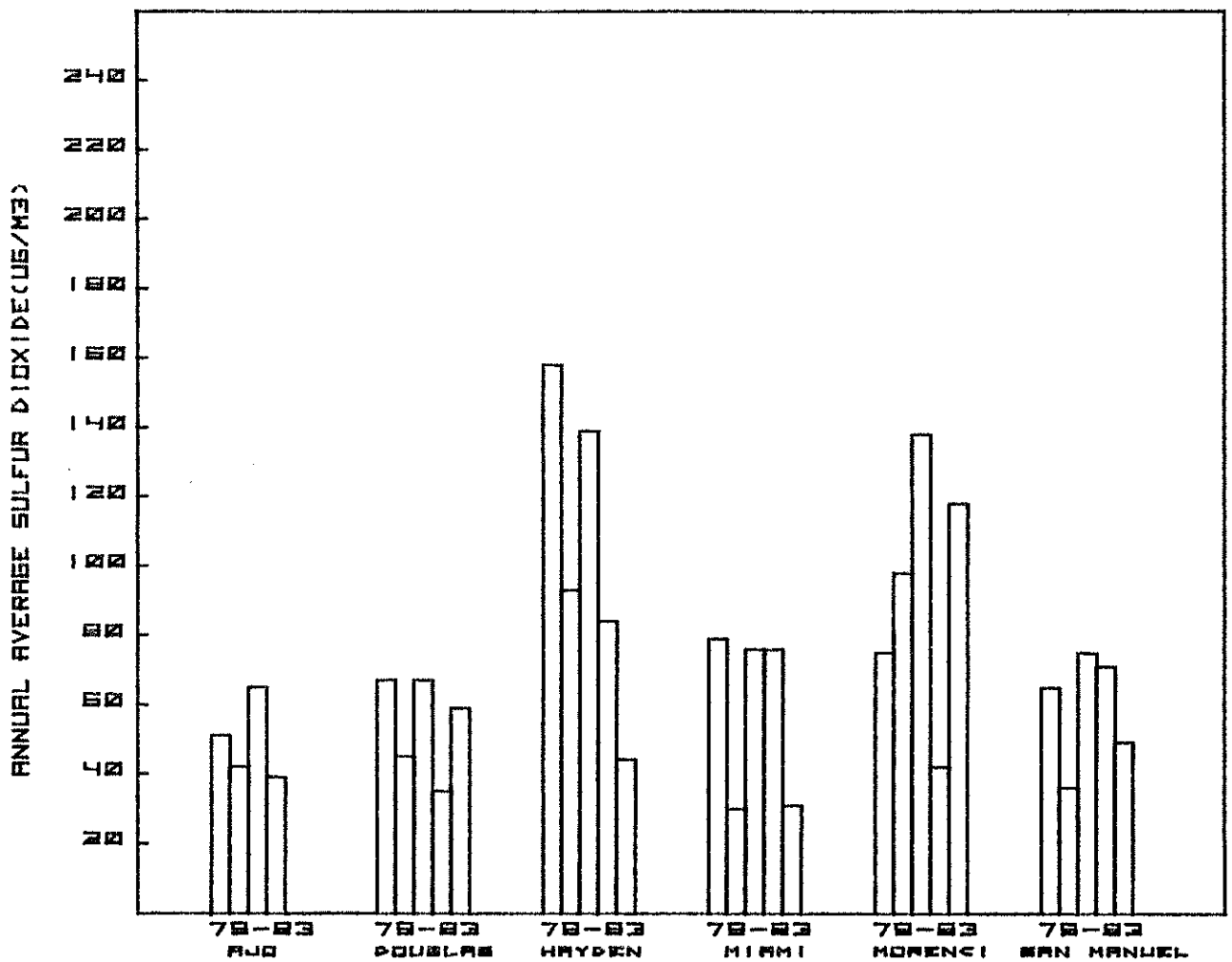

FIGURE 18. SULFUR DIOXIDE CONCENTRATIONS IN AJO (OXIDATION POND), DOUGLAS (COUNTY HOSPITAL), HAYDEN (MONTGOMERY RANCH), MIAMI (JONES RANCH), MORENCI (STARGO), AND SAN MANUEL (GOLF COURSE).

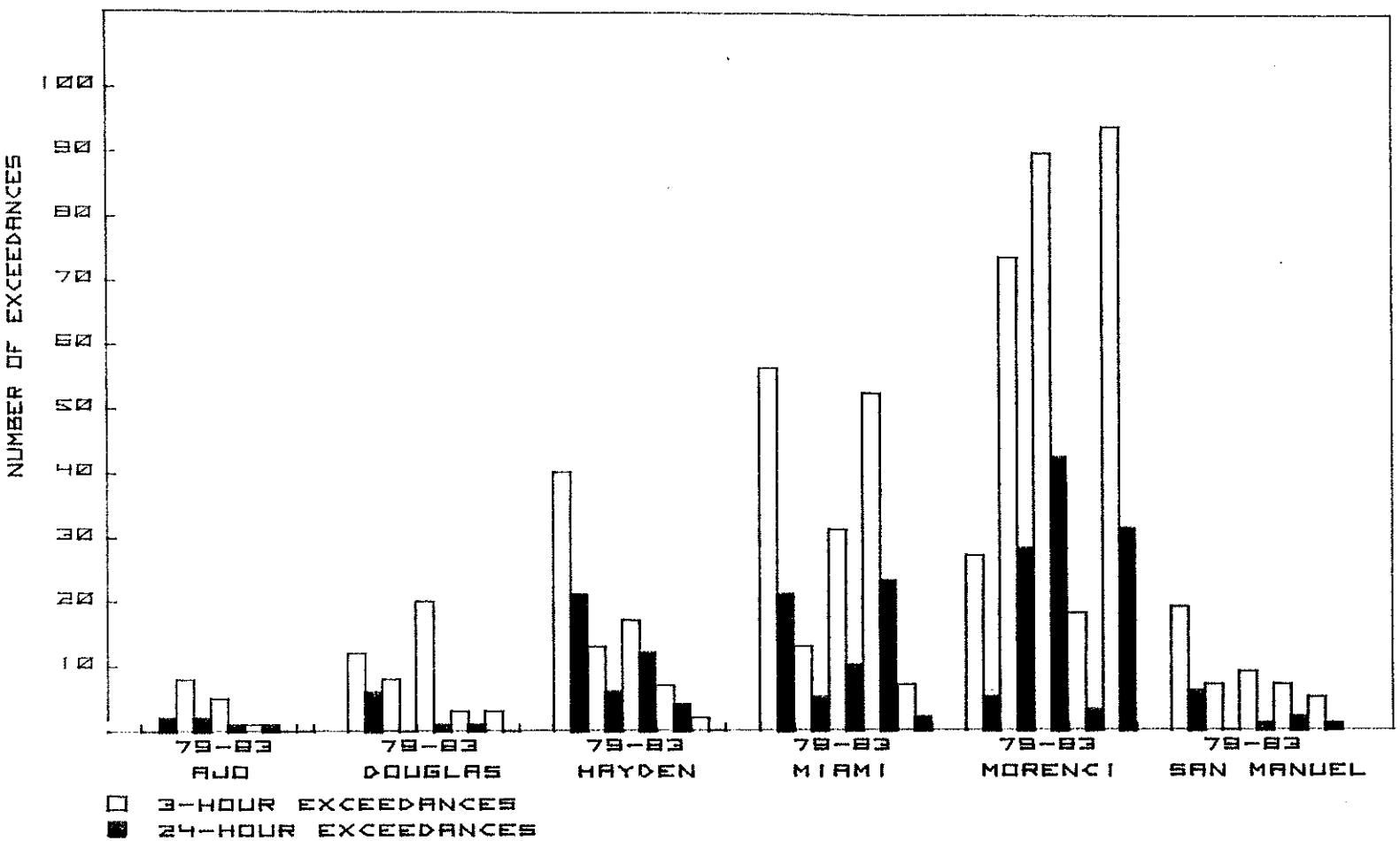

FIGURE 18. SULFUR DIOXIDE EXCEEDANCES REPORTED IN SMELTER TOWNS.

APPENDIX C Summary of Air Quality Standards and Emergency Episode Levels

SUMMARY OF AMBIENT AIR QUALITY STANDARDS - STATE AND FEDERAL STDS. (a)

In ug/m^3 (and ppm)

Pollutant	Averaging Time	Primary	Secondary
Carbon Monoxide(b)	1-hour	40 (35)	40 (35)
	8-hour	10 (9)	10 (9)
Nitrogen Dioxide	Annual	100 (.05)	100 (.05)
Ozone	1-hour	235 (.12)	235 (.12)
Particulates	24-hour	260 (-)	150 (-)
	Annual (Geom.Mean)	75 (-)	60 (-)
Sulfur Dioxide	3-hour	---	1300 (.5)
	24-hour	365 (.14)	---
	Annual	80 (.03)	---
Lead	Calendar Quarter	1.5 (-)	1.5 (-)

SUMMARY OF EMERGENCY EPISODE LEVELS - STATE AND FEDERAL

In ug/m^3 (and ppm)

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon Monoxide(b)	1-hour	---	---	---	144 (125)
	4-hour	---	---	---	86.3 (75)
	8-hour	17 (15)	34 (30)	46 (40)	57.5 (50)
Nitrogen Dioxide	1-hour	1130 (.6)	2260 (1.2)	3000 (1.6)	3750 (2.0)
	24-hour	282 (.15)	565 (.3)	750 (.4)	938 (.5)
Ozone	1-hour	State 400 (.2) Federal 200 (.1)	800 (.4)	1000 (.5)	1200 (.6)
Particulates	24-hour	375 (-)	625 (-)	875 (-)	1000 (-)
Sulfur Dioxide	24-hour	800 (.3)	1600 (.6)	2100 (.8)	2620 (1.0)
Sulfur Dioxide(c) & Particulates combined	24-hour	65000 (-)	261000 (-)	393000 (-)	490000 (-)

(a) Standards are not to be exceeded more than once per year with one exception. In the case of ozone, compliance is determined by the number of days on which the ozone standard is exceeded. The number of ozone exceedance days per year, based on a 3-year running average, is not to exceed 1.0.

(b) In mg/m^3 (and ppm)

(c) In $(ug/m^3)^2$

APPENDIX D Glossary of Pollutants in the Ambient Air

Glossary of Pollutants in the Ambient Air

Carbon Monoxide

Carbon monoxide is a colorless, odorless gas formed by incomplete combustion of fuels. The major source of carbon monoxide in the urban air is motor vehicle operation. Aggravation of angina pectoris and other cardiovascular diseases is its major effect on human health.

Hydrocarbons

Hydrocarbons, which are a group of compounds composed of carbon and hydrogen, are the constituents of gaseous and liquid fuels. As a result, motor vehicles, service stations and bulk fuel storage tanks are the chief origins of hydrocarbon emissions. At the concentrations found in ambient air, hydrocarbons are not harmful, but they react with nitrogen oxides to form ozone and other oxidants, substances known to be at deleterious levels in the atmosphere.

Lead

In Arizona lead originates primarily from motor vehicle operation due to the use of lead antiknock compounds in gasoline. Lead concentrations are expected to stay at acceptable levels in the Phoenix area due to increased usage of unleaded gasoline instead of leaded gasoline. The health effects of lead include damage to the blood, the kidneys, and the nervous and reproductive systems in humans, resulting in anemia, brain and kidney diseases, and infertility.

Nitrates

Nitrates is a term referring to nitric acid and salts of nitric acid which are formed in the atmosphere by various complex reactions of nitrogen oxides with other substances. Nitrates exist as finely divided particulates which inhibit visibility, damage the respiratory system, exacerbate respiratory diseases, and soil and damage materials.

Nitrogen Dioxide

Nitrogen dioxide is a reddish-brown corrosive gas produced during high temperature fuel combustion. Power plants and motor vehicles generate the bulk of nitrogen dioxide in the atmosphere. It causes pulmonary edema and bronchitis in children.

Nitrogen Oxides

In air pollution terminology, nitrogen oxides include nitrogen dioxide and nitric oxide only. Both of these gases are emitted by the same major sources, namely motor vehicles and power plants, as a result of high temperature fuel combustion. Nitrogen oxides react with hydrocarbons in the atmosphere to produce ozone and other oxidants.

Oxidants (Ozone)

Oxidants are oxygen-containing gases or vapors that are formed in the atmosphere by the reaction of hydrocarbons with nitrogen oxides. Since sunlight accelerates this reaction, it is referred to as the photochemical reaction and the products formed are sometimes referred to as photochemical oxidants. The principal oxidant is ozone, a pungent, bluish gas which is a triatomic form of oxygen. Oxidants irritate the eyes, nose, and throat, impair breathing, and limit physical exercise. These effects are more severe in persons with chronic lung and cardiovascular diseases.

Particulates

They are small, solid particles or liquid droplets which are suspended in the atmosphere. Examples of particulates include dust, smoke, mist and fog. Particulates reduce visibility in the atmosphere, damage the respiratory system, aggravate respiratory diseases, and soil and damage materials. Major sources of particulates in Arizona are motor vehicle traffic on paved and unpaved roads and streets, construction activity, agriculture, wood burning, industrial and power generating plants and windblown desert lands.

Sulfates

Sulfates are a group of compounds including sulfuric acid and salts of sulfuric acid which are emitted by power plants and copper smelters. They are also produced in the atmosphere by the oxidation of sulfur dioxide. Sulfates exist as small particles which cause the same effects on visibility, human health, and materials as noted above for nitrates and particulates.

Sulfur Dioxide

Sulfur dioxide is a heavy, acrid, colorless gas generated by combustion of sulfur-containing fuels in power generating and industrial plants. Another important source in Arizona is the smelting of sulfide ore in the copper industry. Aggravation of respiratory diseases is the primary health effect of sulfur dioxide.

APPENDIX E Air Sampling Techniques

Air Sampling Techniques

Carbon Monoxide

Carbon monoxide is monitored by non-dispersive infrared absorption, a method which is based on the fact that carbon monoxide absorbs infrared radiation at a wavelength at which other gases do not absorb infrared radiation.

Lead

Concentrations of lead are determined by means of nitric acid extraction of particulate samples followed by atomic absorption analysis of the nitric acid extract.

Nitrates

Nitrates analysis is performed through water extraction of particulate samples and specific ion electrode analysis of the water extract.

Nitrogen Dioxide

The chemiluminescent technique is based on the catalytic conversion of nitrogen dioxide in the air sample to nitric oxide followed by chemiluminescent analysis of the effluent from the convertor for nitric oxide. This measurement represents the concentration of nitrogen dioxide plus nitric oxide in the sample. It is necessary to concurrently monitor the concentration of nitric oxide only by chemiluminescent analysis of that part of the air sample which bypasses the catalytic convertor. The nitric oxide concentration is subtracted from the concentration of nitrogen dioxide plus nitric oxide to give the nitrogen dioxide concentration.

Ozone

The two most widely used methods for ozone monitoring are ultraviolet (UV) and chemiluminescent. In the UV analyzer concentrations are determined by measuring the quantity of UV radiation absorbed by ozone in the air sample.

The chemiluminescent analyzer monitors ozone by detecting the amount of light emitted due to the reaction of ozone with ethylene.

Particulates

Particulate concentrations are measured by passing a metered flow of air for 24 hours through a pre-weighed 8 X 10 inch glass fiber filter. Particulates in the air sample are trapped on the filter which is delivered to the laboratory for reweighing. The gain in weight of the filter during sampling represents the quantity of partuculates collected. The concentration is calculated by dividing the weight of particulates by the volume of air passed through the filter.

The filter is then divided into sections for chemical analysis for sulfates, nitrates, lead and other metals.

Sulfates

Concentrations of sulfates are determined by water extraction of particulate samples followed by turbidimetric analysis of the water extract.

Sulfur Dioxide

In Arizona three methods of sampling are used, including the coulometric, fluorescent and flame photometric methods. The coulometric method consists of scrubbing sample air in an aqueous solution of potassium bromide, bromine and sulfuric acid. Sulfur dioxide in the air sample reacts with bromine, causing a change in electrical potential at the anode. This voltage change is proportional to the amount of bromine which has reacted with sulfur dioxide. Thus, the voltage change is a direct indication of the sulfur dioxide concentration in the air sample.

In the fluorescent analyzer sample air is drawn into a chamber and irradiated with ultraviolet light. Any sulfur dioxide in the airstream is excited to a higher energy state. The excited sulfur dioxide then reverts to a lower energy state by emitting radiation which is measured by a photomultiplier tube.

The flame photometer technique is similar to the fluorescent in that emitted radiation is proportional to the sulfur dioxide concentration. In the flame photometer, however, the radiation is emitted by excited sulfur molecules rather than sulfur dioxide molecules. Sulfur molecules are produced by passing sample air into a hydrogen flame where sulfur dioxide is converted to elemental sulfur. Sulfides must be removed by a scrubber before the air sample is passed into the hydrogen flame because they will also convert to elemental sulfur.